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ANNOTATED AND INDEXED

By

KENNETH WALTER CAMERON

Trinity College, Hartford

VOLUME

II



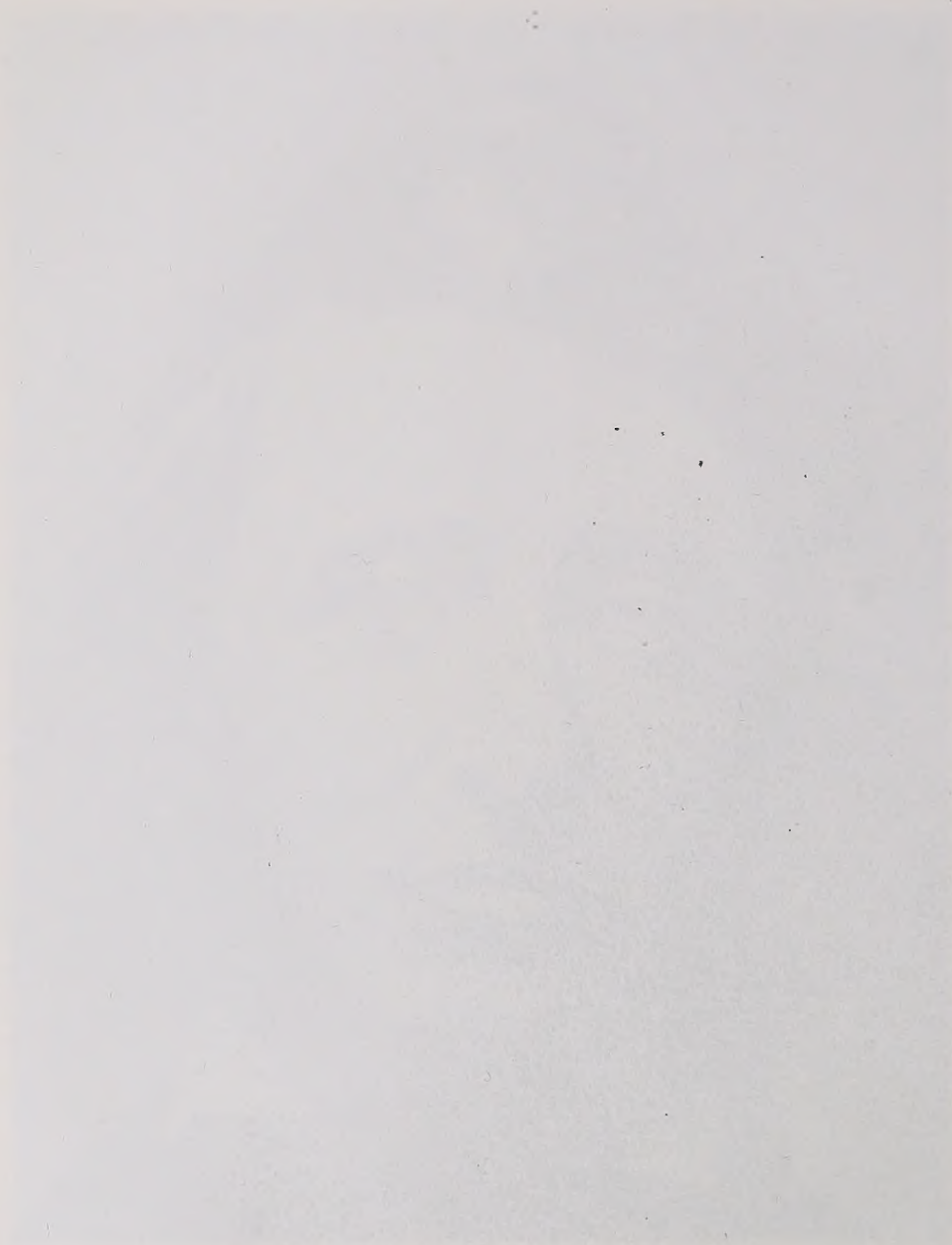
TRANSCENDENTAL BOOKS

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FOREWORD

Whereas Volume Three will provide a definitive edition of the Fact Book itself together with an extensive index designed to assist those reading Thoreau's works in depth and those who will undertake vast editorial projects of the coming decade, the present volume may be considered (along with the Journal) as Thoreau's workshop. It is a veritable library of his sources, the importance of which Prof. John Aldrich Christie (Thoreau as World Traveler) has recently demonstrated. They added levels of meaning to all that he wrote and provided some of his richest imagery.

Each of Thoreau's borrowings from his sources is here presented in context so that the student may see at a glance how he read, what he looked for, how he compressed his harvest, and how he carefully indicated exact quotation. Indeed, herein one may essentially read his one hundred and fifty sources in two hundred volumes as he read them, observe what he skimmed, and note what he probably carried in his memory. Since extracts from this same library were also copied into the Journal, this work must be considered an extension thereof and one of its important dimensions.

I have placed in boxes or frames most of the passages Thoreau thought important so that the reader of the present volume will find a "Q" text—in some respects more useful than the transcript of the Fact Book itself. The following table of contents will provide students with a fresh bibliography of Thoreau's reading.

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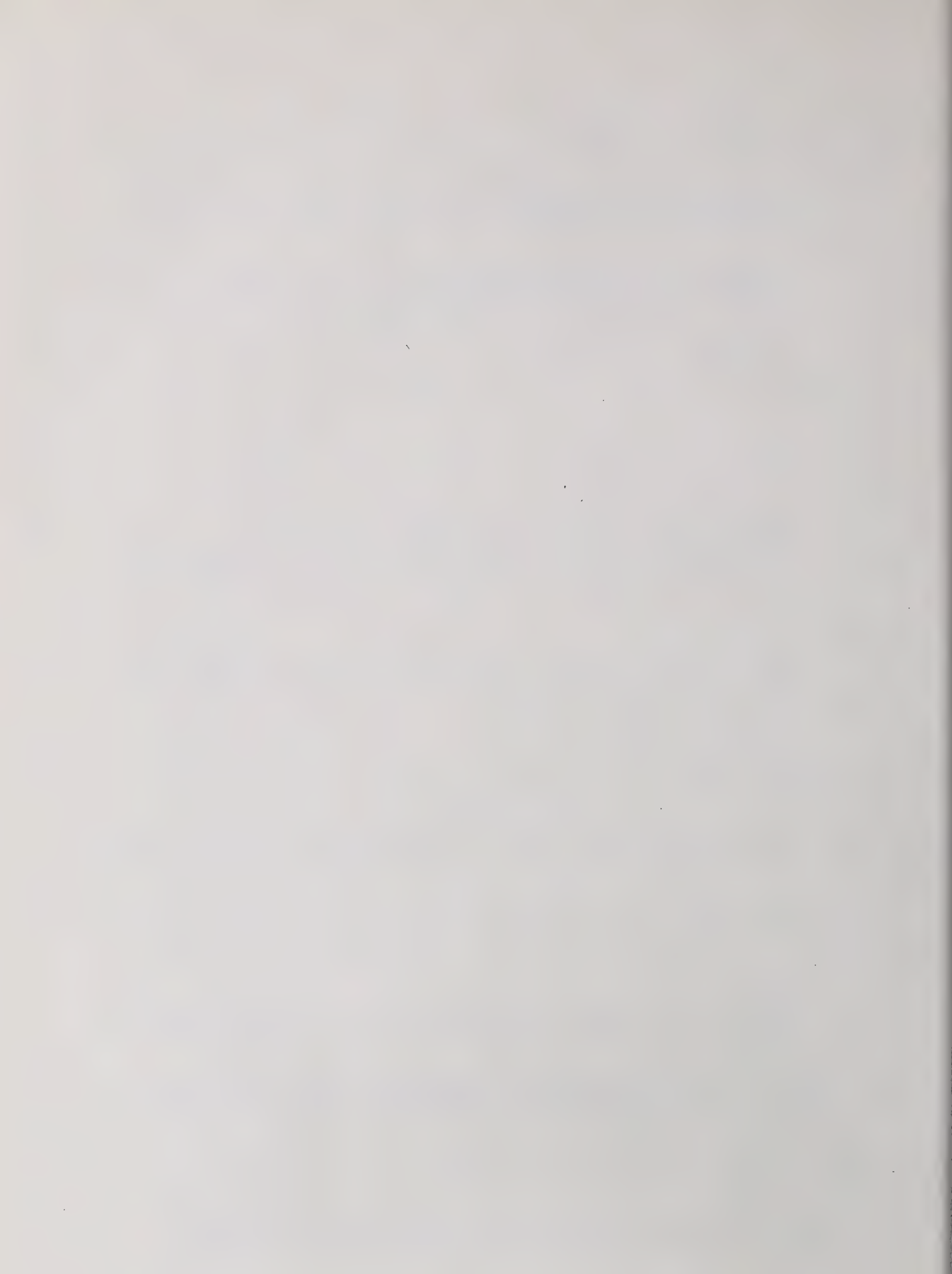
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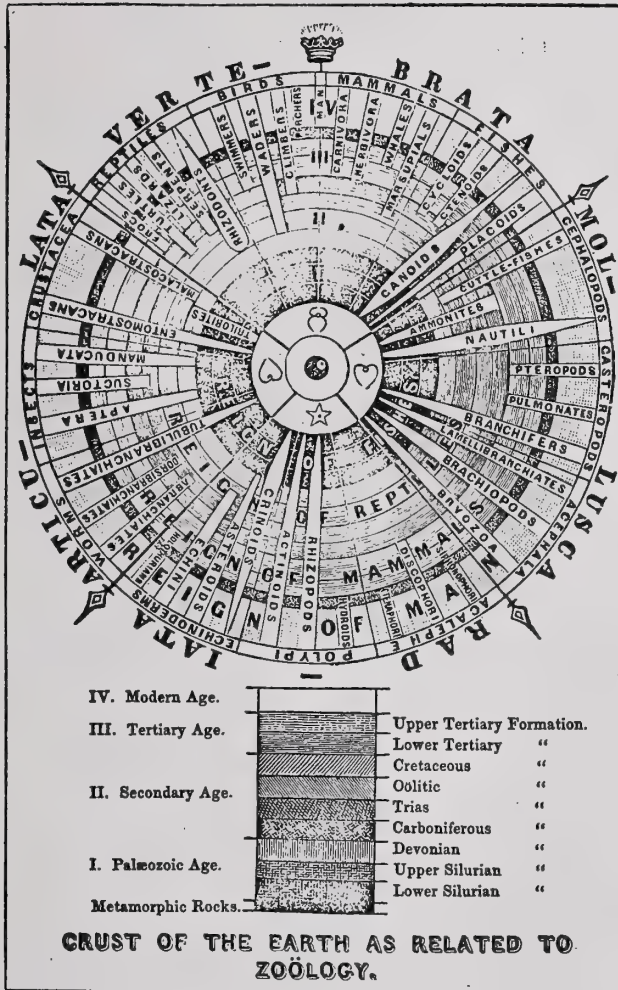


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PRINCIPLES OF ZOÖLOGY:

TOUCHING

THE STRUCTURE, DEVELOPMENT, DISTRIBUTION,
AND NATURAL ARRANGEMENT

OF THE

RACES OF ANIMALS, LIVING AND EXTINCT

WITH NUMEROUS ILLUSTRATIONS.

PART I.

COMPARATIVE PHYSIOLOGY.

FOR THE USE OF SCHOOLS AND COLLEGES.

BY

LOUIS AGASSIZ AND A. A. GOULD.

REVISED EDITION.

BOSTON:

GOULD AND LINCOLN,

59 WASHINGTON STREET.

1851.

PREFACE TO THE REVISED EDITION.

IN revising the present work, the authors have endeavored to render more precise those passages which admitted of too broad a signification or of a double interpretation; and to correct such errors as had arisen from inadvertence, or such as the rapid progress of Science has disclosed. They are indebted for many suggestions on these points to several distinguished teachers who have used the work as a text book, and more especially to Professor Wyman, of Harvard University. Several entirely new paragraphs have also been added.

A list of some of the principal authors who have made original researches, or of treatises which enter more into detail than was admissible in an elementary work, has been given at the close of the volume, for the use of those who would pursue the subject of Zoölogy in a more extended manner.

The work having thus been revised and enlarged, the authors submit it to the public with increased confidence in its accuracy and usefulness.

Boston, February 1, 1851.

PREFACE.

E. Desor, for many years an associate of Professor Agassiz, from Count Pourtalès and E. C. Cabot, Esq., and also from Professor Asa Gray, by valuable suggestions in the revision of the letter-press.

The first part is devoted to Comparative Anatomy, Physiology, and Embryology, as the basis of Classification, and also to the illustration of the geographical distribution and the geological succession of Animals; the second to Systematic Zoölogy, in which the principles of Classification will be applied, and the principal groups of animals will be briefly characterized.

Should our aim be attained, this work will produce more enlarged ideas of man's relations to Nature, and more exalted conceptions of the Plan of Creation and its Great Author.

Boston, June 1, 1848.

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contained several hundred eggs, which, on being freed from their envelop, float in the water. As these eggs are innumerable, it is not astonishing that the Sculpins should occasionally swallow some of them with their prey. The eggs, being thus introduced into the stomach of the fish, find conditions favorable to their development; and thus the species is propagated, and at the same time transmitted from one generation of the fish to another. The eggs which are not swallowed are probably lost.

363. All animals swallow, in the same manner, with their food, and in the water they drink, numerous eggs of such parasites, any one of which, finding in the intestine of the animal favorable conditions, may be hatched. It is probable that each animal affords the proper conditions for some particular species of worm; and thus we may explain how it is that most animals have parasites peculiar to themselves.

364. As respects the Infusoria, we also know that most of them, the Rotifera especially, lay eggs. These eggs, which are extremely minute, (some of them only $\frac{1}{12}$ of an inch in diameter,) are scattered every where in great profusion, in water, in the air, in mist, and even in snow.

Assiduous observers have not only seen the eggs laid, but moreover, have followed their development, and have seen the young animal forming in the egg, then escaping from it, increasing in size, and, in its turn, laying eggs. They have been able, in some instances, to follow them even to the fifth and sixth generation.

365. This being the case, it is much more natural to suppose that the Infusoria* are products of like germs, than

SPONTANEOUS GENERATION.

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to assign to them a spontaneous origin altogether incompatible with what we know of organic development. Their rapid appearance is not at all astonishing, when we reflect that some mushrooms attain a considerable size in a few hours, but yet pass through all the phases of regular growth; and, indeed, since we have ascertained the different modes of generation among the lower animals, no substantial difficulties to the axiom, "*omne vivum ex ovo*," (275,) any longer exist.

DISTRIBUTION OF THE FAUNAS.

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a close analogy to those of the arctic region. It is another glacial fauna, namely, the antarctic. Having thus sketched the general divisions of the faunas, it remains to point out the principal features of each of them.

420. I. ARCTIC FAUNA. — The predominant feature of the Arctic Fauna is its uniformity. The species are few in number; but, on the other hand, the number of individuals is immense. We need only refer to the clouds of birds which hover upon the islands and shores of the North; the shoals of fishes, the salmon among others, which throng the coasts of Greenland, Iceland, and Hudson's Bay. There is great uniformity, also, in the form and color of these animals. Not a single bird of brilliant plumage is found, and few fishes with varied hues. Their forms are regular, and their tints as dusky as the northern heavens. The most conspicuous animals are the white-bear, the moose, the reindeer, the musk-ox, the white-fox, the polar-hare, the lemming, and

various Seals; but the most important are the Whales, which, it is to be remarked, rank lowest of all the Mammals. Among the Birds may be enumerated some sea-eagles and a few Waders, while the great majority are aquatic species, such as gulls, cormorants, divers, petrels, ducks, geese, gannets, &c., all belonging to the lowest orders of Birds. Reptiles are altogether wanting. The Articulata are represented by numerous marine worms, and by minute crustaceans of the orders Isopoda and Amphipoda. Insects are rare, and of inferior types. Of the type of Mollusks, there are Acephala, particularly Tunicata, fewer Gasteropods, and very few Cephalopods. Among the Radiata are a great number of jelly-fishes, particularly the Berœe; and to conclude with the Echinoderms, there are several star-fishes and Echini, but few Holothuriæ. The class of Polypi is very scantily represented, and those producing stony corals are entirely wanting.

202 GEOGRAPHICAL DISTRIBUTION OF ANIMALS.

The Canadian elk is confined to the northern portion of the fauna; while the prairie wolf, the fox-squirrel, the Bassaris, and numerous birds, never leave the southern portion.*

430. In America, as in the Old World, the temperate fauna is further subdivided into several districts, which may be regarded as so many zoological provinces, in each of which there is a certain number of animals differing from those in the others, though very closely allied. Temperate America presents us with a striking example in this respect. We have, on the one hand:

1st. The fauna of the United States properly so called, on this side of the Rocky Mountains.

2d. The fauna of Oregon and California, beyond those mountains.

Though there are some animals which traverse the chain of the Rocky Mountains, and are found in the prairies of the Missouri as well as on the banks of the Columbia, as, for example, the Rocky Mountain deer, (*Antelope furcifer*), yet, if we regard the whole assemblage of animals, they are found to differ entirely. Thus, the rodents, part of the ruminants, the insects, and all the mollusks, belong to distinct species.

431. The faunas or zoological provinces of the Old World which correspond to these are:

* The types which are peculiar to temperate America, and are not found in Europe, are the Opossum, several genera of Insectivora, among them the shrew-mole (*Scalops aquaticus*) and the star-nose mole, (*Condylura cristata*), which replaces the Mygale of the Old World; several genera of rodents, especially the muskrat. Among the types characteristic of America must also be reckoned the snapping-turtle among the tortoises; the Menobranchus and Menopoma, among the Salamanders; the Garpike and Amia among the fishes; and finally, among the Crustacea, the Limulus. Among the types which are wanting in temperate America, and which are found in Europe, may be cited the horse, the wild boar, and the true mouse. All the species of domestic mice which live in America have been brought from the Old World.

DISTRIBUTION OF THE FAUNAS.

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and variety elsewhere unknown; and lastly, the Polyyps there display an activity of which the other zones present no example. Whole groups of islands are surrounded with coral reefs formed by those little animals.

435. The variety of the tropical fauna is further enriched

by the circumstance that each continent furnishes new and peculiar forms. Sometimes whole types are limited to one continent, as the sloth, the toucans, and the humming-birds to America, the giraffe and hippopotamus to Africa; and again animals of the same group have different characteristics, according as they are found on different continents. Thus, the monkeys of America have flat and widely separated nostrils, thirty-six teeth, and generally a long, prehensile tail. The monkeys of the Old World, on the contrary, have nostrils close together, only thirty-two teeth, and not one of them has a prehensile tail.



LAKE NGAMI;

OR,

EXPLORATIONS AND DISCOVERIES

DURING

FOUR YEARS' WANDERINGS IN THE WILDS

OF

SOUTHWESTERN AFRICA.

BY
CHARLES JOHN ANDERSSON.

WITH NUMEROUS ILLUSTRATIONS,
REPRESENTING SPORTING ADVENTURES, SUBJECTS OF NATURAL HISTORY,
DEVICES FOR DESTROYING WILD ANIMALS, &c.

NEW YORK:
HARPER & BROTHERS, PUBLISHERS,
FRANKLIN SQUARE
1856.

EFFECTS OF EXCESSIVE HEAT.

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miles as the crow flies from the sea, and where there is almost always a refreshing breeze, the thermometer, at noon, in an airy situation, and in the shade, rises, for many days together, to 110 degrees of Fahrenheit!

In consequence of the fiery state of the atmosphere, every article of horn or wood shrank and contracted most surprisingly. Even the gun-stocks, made of the best English walnut, lost an eighth of an inch of their original solidity. The ink dried in the pen almost the instant it left the stand.*

Our wagons, moreover, which on leaving Scheppmansdorf were in excellent order, were now quite infirm. The spokes and the tires became loose, and the felloes and naves exhibited large gaps and fissures. To save them, however, as much as possible, we set about making a shed of reeds and rushes, strongly bound together by cords and light wooden sticks.

As soon as this was finished, I began my preparations for

visiting Galton at Barmen; and as Mr. Schöneberg was also anxious to make the acquaintance of Mr. Hahn, his intended colleague, it was agreed that we should travel together. On the day appointed we set out, mounted on oxen, and accompanied by a Hottentot as guide and interpreter. Besides his native tongue, this man spoke Dutch and Damara fluently.

* Captain Sturt, who in his explorations in Australia seems to have experienced the same heat in even a greater degree, says,

"The mean of the thermometer for the months of December, January, and February had been 101, 104, and 105 degrees respectively, in the shade. Under its effects, every screw in our boxes had been drawn, and the horn handles of our instruments, as well as our combs, were split into fine laminae. The lead dropped out of our pencils, and our signal rockets were entirely spoiled; our hair, as well as the wool on the sheep, ceased to grow, and our nails had become brittle as glass. The flour lost more than eight per cent. of its original weight, and the other provisions in still greater proportion." In another part of his narrative, this enterprising explorer mentions the quicksilver once to have risen to 132 degrees in the shade, the thermometer being placed in the fork of a tree, five feet from the ground!

previously traversed. In the course of the day we crossed the dry beds of several large, sandy, and periodical streams, which were all tributaries to the Swakop. The country near these streams was thickly studded with splendid forests of the gigantic and park-like acacia, known to the Dutch as the "kameel-doorn," or giraffe thorn (*acacia giraffa*). This tree derives its name from its constituting the favorite and principal food of the beautiful camelopard. On account of its immense size and peculiar growth, having the foliage disposed from the top downward in umbrella-shaped masses, it is a great ornament to the country; but, strange to say, it is invariably found only in arid districts.

The "kameel-doorn" is evidently of very slow growth, and requires, probably, many hundred years to arrive at maturity. The grain is therefore very close; and the wood is so heavy that, after being dried for years, it will sink when thrown into the water. Our northern oak can in no wise be compared with it as regards hardness and solidity. The

grain is, however, rather short, and the wood consequently brittle. Notwithstanding this defect, it is very strong, and is extensively used for building purposes and implements of husbandry. It is, moreover, almost the only wood strong enough for the axle-trees of wagons. Tools of the best materials, however, are indispensable in working it. I have seen many a well-tempered axe and adze blunted and spoiled when brought in contact with it. The outer part of the tree is of a whitish color, but the heart is reddish-brown, not unlike mahogany, and capable of a high polish.

It is in the branches of this acacia, mentioned by several South African travelers, that the social grossbeak (*locia socia*) chiefly constructs its interesting and singular nest.

After a day and a half travel we suddenly found ourselves on the brink of Otjikoto, the most extraordinary chasm it was ever my fortune to see. It is scooped, so to say, out of the solid limestone rock, and, though on a thousand times larger scale, not unlike the *Elv-gryta* one so commonly meets in Scandinavia. The form of Otjikoto is cylindrical; its diameter upward of four hundred feet, and its depth, as we ascertained by the lead-line, two hundred and fifteen—that is,



OTJIKOTO FOUNTAIN.

at the sides, for we had no means of plumbing the middle, but had reason to believe the depth to be pretty uniform throughout. To about thirty feet of the brink it is filled with water.*

* Shortly before reaching "Baboon Fountain" I should remark that, at a place called Orujo, we saw a cavity of a similar shape, though on an infinitely smaller scale. It consisted of a circular-shaped basin in the limestone rock ninety feet in diameter by thirty in depth. As it

Otjikoto, "one of the most wonderful of Nature's freaks," is situated at the northern extremity of those broken hills which take their rise in the neighborhood of Okamabuti, and in the midst of a dense coppice. So effectually is it hidden from view, that a person might pass within fifty paces of it without being aware of its existence. Owing to its steep and rugged sides, cattle have not access to the water; and even a man can only approach this enormous well by means of a steep and slippery footpath. No perceptible difference could be observed in the height of the water; and the Ovambo informed us that, as long as they and their fathers remembered, it had always been the same. It is difficult to imagine how or whence Otjikoto receives its supplies. A spacious cavern, only visible and accessible from the water, may possibly be the grand reservoir.

After gratifying our curiosity, Galton and myself, standing in need of a bath, plunged head foremost into the profound abyss. The natives were utterly astounded. Before reaching Otjikoto, they had told us that if a man or beast was so unfortunate as to fall into the pool, he would inevitably perish. We attributed this to superstitious notions; but the mystery was now explained. The art of swimming was totally unknown in these regions. The water was very cold, and, from its great depth, the temperature is likely to be the same throughout the year.

We swam into the cavern to which allusion has just been made. The transparency of the water, which was of the deepest sea-green, was remarkable; and the effect produced in the watery mirror by the reflection of the crystallized walls and roof of the cavern appeared very striking and beautiful. In this mysterious spot, two owls and a great number of bats had taken up their abode. On approaching

was dry at the time, we ascertained that the bottom was flat, or nearly so. In various other places we also met with similar basins, but on a still smaller scale than Orujo.

The nights had now become bitterly cold. In crossing the Otjihako-tja-Muteya we were obliged to bivouac on this bleak and exposed plain without a particle of fuel. What with the piercing wind and low temperature, it was one of the most trying nights I remember to have spent in Africa. Indeed, I hardly ever felt the cold more during the most severe Scandinavian winter. Even the cattle were so exceedingly distressed that several of our best draft-oxen never thoroughly recovered. Our poor Damaras suffered fearfully; and it was only by huddling themselves together at the bottom of a dried-up well that they were enabled to keep the least warmth in their bodies. Timbo, however, appeared to be the greatest sufferer. One morning we were amazed at finding his dark, shiny skin suddenly changed into a pale ashy gray.

Owing to the scarcity of water at this time of the year, game was rare. Indeed, we only met with animals, such as the giraffe, the koodoo, the gemsbok, the kudu, &c., that either wholly or in great part can do without water.

On the 1st of July, after about a fortnight's steady travel, we reached our encampment in safety. The two hundred miles of country we had crossed presented, perhaps, as dreary and uninteresting a prospect as can well be imagined.

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EXTRAORDINARY VISITATION.

One morning, as we were about to yoke the oxen, we were amused to see them suddenly start off in every direction in the wildest confusion, and cutting the most ridiculous capers.

The cause of this commotion was the arrival of a large flock of the *buphaga africana*, which alighted on the backs of the cattle for the purpose of feeding on the ticks with which their hides are covered. By means of their long claws and elastic tails, these birds are enabled to cling to and search every part of the beast. It was evident, however, that our oxen had never experienced a similar visitation; no wonder, therefore, that they were taken somewhat aback at being thus unceremoniously assailed.

The *buphaga africana* is also a frequent companion of the rhinoceros, to which, besides being of service in ridding him of many of the insects that infest his hide, it performs the important part of sentinel. On many occasions has this watchful bird prevented me from getting a shot at that beast. The moment it suspects danger, it flies almost perpendicularly up into the air, uttering sharp, shrill notes, that nev-

BIRDS' NESTS USED FOR WADDING.

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er fail to attract the attention of the rhinoceros, who, without waiting to ascertain the cause, almost instantly seeks safety in a precipitate flight. According to Mr. Cumming, these birds also attend upon the hippopotamus.

Another bird (*texor erythrorhynchus*) is also in the habit of feeding upon parasitical insects, but is said to restrict its visits to the buffalo. In the part of Damara-land of which I am now speaking, that animal is unknown, yet the bird was in very great numbers. It appeared to be very social in its habits, living in colonies, and building its nest, which consists of dry sticks, on lofty trees.

We also made acquaintance with a small, sparrow-looking bird, the *amadina squamifrons*, which deserves notice on account of its peculiar and interesting nest. According to Dr. Andrew Smith, this is placed on a small shrub, and is constructed of grass. But in Damara-land and parts adjacent, the materials are of a beautifully soft texture, not unlike sheep's wool. I never could discover the plant from which it was procured. The Hottentots use it as a substitute for gun-wadding, and it is by no means a bad makeshift. The nest is so strongly put together that one has difficulty in separating it. When the old bird absents itself, it effectually conceals the opening of the nest from view. Even long after I was acquainted with this peculiarity, I was puzzled to find it out. Just above the entrance is a small hollow, which has no communication with the interior of the nest, but which, by the uninitiated, is often mistaken for it. In this tube the male bird sits at night.

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POWER OF ANIMALS TO SCENT HERBAGE.

The animals, which during the dry season are compelled to gather round the springs and other permanent waters, were enabled, by the late rains, to scatter themselves over a large extent of country, and were now difficult to find. There can

be little doubt that the instinctive power of animals—domesticated as well as wild—is capable of catching the scent of humid winds and green herbage at a very great distance. Thus I have often seen oxen turn their heads toward the quarter where distant lightning indicated that rain had fallen, and sniff with evident pleasure the breeze produced by colder air. Mr. Moffat, the missionary, mentions an instance where a great number of cattle were entirely lost, solely, as he supposes, from this cause.

"Many years previous to my sojourn in Namaqua-land," says the reverend gentleman, "Afrikaner thus lost the greater part of his cattle. One evening a strong wind commenced blowing from the north; it smelt of green grass, as the natives expressed it. The cattle, not being in folds, started off after dark. The circumstance being unprecedented, it was supposed they had merely wandered out to the common, where they were accustomed to graze; but it was found, after much search, that some thousands of cattle had directed their course to the north. A few were recovered, but the majority escaped to the Damara country, after having been pursued hundreds of miles."

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OSTRICHES—MANŒUVRES OF THE OLD BIRD.

The moment the parent birds became aware of our intention, they set off at full speed, the female leading the way, the young following in her wake, and the cock, though at some little distance, bringing up the rear of the family party. It was very touching to observe the anxiety the old birds evinced for the safety of their progeny. Finding that we were quickly gaining upon them, the male at once slackened his pace, and diverged somewhat from his course; but, seeing that we were not to be diverted from our purpose, he again increased his speed, and, with wings drooping so as almost to touch the ground, he hovered round us, now in wide circles, and then decreasing the circumference till he came almost within pistol-shot, when he abruptly threw himself on

the ground, and struggled desperately to regain his legs, as it appeared, like a bird that has been badly wounded. Having previously fired at him, I really thought he was disabled, and made quickly toward him. But this was only a *ruse* on his part; for, on my nearer approach, he slowly rose and began to run in an opposite direction to that of the female, who by this time was considerably ahead with her charge.

After about an hour's severe chase, we secured nine of the brood; and, though it consisted of about double that number,

250 THE OSTRICH—WHERE FOUND—SIZE AND WEIGHT.

we found it necessary to be contented with what we had bagged.*

On returning to the Bay, however, the next morning in a mule-cart, Mr. Galton again encountered the same birds with the remainder of the family, and, after a short race, captured six more of the chicks.

The ostrich (which, from possessing the rudiments of a gall-bladder, and the absence of wings fit for flight, seems to form a kind of connecting link between the two great families of *mammalia* and *aves*) is an inhabitant of a large portion of Africa, but rarely extends farther east than the deserts of Arabia. Throughout the Indian Archipelago, the family of birds (of which the ostrich is the leading type) is represented by the cassowary; in Australia by the emeu; in the southern extremity of the western hemisphere by the rhea; and even in Europe, though somewhat departing from the type, it has its representative in the stately bustard.

AGE—CRY—STRENGTH—SPEED—FOOD. 251

I could never obtain any data that would enable me to form a correct estimate of the age of the ostrich, but it may fairly be concluded that he lives between twenty and thirty years.

The cry of the ostrich so greatly resembles that of a lion as occasionally to deceive even the natives. It is usually heard early in the morning, and at times also at night.

The strength of the ostrich is enormous. A single blow from its gigantic foot (it always strikes forward) is sufficient to prostrate, nay, to kill many beasts of prey, such as the hyæna, the panther, the wild dog, the jackal, and others.

The ostrich is exceedingly swift of foot, under ordinary circumstances outrunning a fleet horse: "What time she lifteth up herself on high, she scorneth the horse and its rider." On special occasions and for a short distance, its speed is truly marvelous, perhaps not much less than a mile in half a minute. Its feet appear hardly to touch the ground, and the length between each stride is not unfrequently twelve to fourteen feet. Indeed, if we are to credit the testimony of Mr. Adanson, who says he witnessed the fact in Senegal, such is the rapidity and muscular power of the ostrich, that, even with two men mounted on his back, he will outstrip an English horse in speed! The ostrich, moreover, is long-winded, if I may use the expression, so that it is a work of time to exhaust the bird.

254 STONES FOUND IN EGGS—THE CHICKS.

A peculiarity in regard to the eggs of the ostrich, and, so far as I am aware, confined to the eggs of this bird alone, is

mentioned by several African travelers. For example: "The farmer here likewise informed me," says the author just quoted, "that a stone or two is sometimes found in the ostrich's eggs, which is hard, white, rather flat and smooth, and about the size of a bean. These stones are cut and made into buttons, but I never had the good fortune to see any of them."

Again: "In these eggs," writes Barrow, "are frequently discovered a number of small oval-shaped pebbles, about the size of a marrowfat pea, of a pale yellow color, and exceedingly hard. In one egg we found nine, and in another twelve of such stones."

Notwithstanding the number of eggs laid, seldom more than thirty to thirty-five are hatched. Almost as soon as the chicks (which are about the size of pullets) have escaped from the shell, they are able to walk about and to follow the mother, on whom they are dependent for a considerable period. And Nature, with her usual care, has provided the young with a color and a covering admirably suited to the localities they frequent. The color is a kind of pepper-and-salt, harmonizing wonderfully with the variegated sand and gravel of the plains, which they are in the habit of traversing. Indeed, when crouching under my very eyes, I have had the greatest difficulty in discerning the chicks. The covering is neither down nor feathers, but a kind of "prickly external," which, no doubt, is an excellent protection against injury from the coarse gravel and the stunted vegetation among which they dwell.

256 EGG-SHELLS—FEATHERS.

Even the egg-shell is of considerable value, and is an excellent vessel for holding liquids of any kind. The Bushmen have hardly any other. By covering it with a light net-work, it may be carried slung across the saddle. Grass, wood, &c., serve as substitutes for corks.

By the monks of Dayr Antonios, we are informed that the Copts (by whom the eggs are looked upon as the emblem of watchfulness, and who suspend them in their churches) pass the cords of their lamps through the shell in order to prevent the rats from coming down and drinking the oil.

The shell of the egg is used medicinally. The Boers, after reducing it to powder and mixing it with vinegar, give it to cattle afflicted with strangury, for which disease it is considered a sovereign remedy. The powder itself is said to be an excellent preservative against blindness.

OSTRICH PARASOLS—SKIN. 257

Some of the tribes of Southern Africa are said to employ ostrich parasols while hunting wild animals, with a similar purpose to that of a Spanish bull-fighter who uses a red cloth. Thus, in case of a wounded beast charging a man, the latter, just at the moment he is about to be seized, suddenly thrusts the supports of the nodding plumes into the ground, and, while the infuriated animal is venting its rage on its supposed victim, the native slips unperceived on one side and transfixes his antagonist.

The skin of the ostrich is also said to be held in great request, and forms no inconsiderable article of commerce. "The whole defensive armor of the Nasamones, inhabitants of Libya, was manufactured of the birds' thick skin, which,

even at the present day, is used as a cuirass by some of the Arab troops."

AN EPICURE—SIMILARITY TO THE CAMEL. 259

"Nothing," says Methuen, in his "Life in the Wilderness," when speaking of a female ostrich that came under his immediate notice, "disturbed the ostrich's digestion: dyspepsia was a thing 'undreamt of in its philosophy.' One day, a Muscovy duck brought a promising brood of ducklings into the world, and with maternal pride conducted them forth into the yard. Up, with solemn and measured stride, walked the ostrich, and, wearing the most mild, benignant cast of face, swallowed them all, one after the other, like so many oysters, regarding the indignant hissings and bristling plumage of the hapless mother with stoical indifference."

The ostrich is gregarious, and is met with in troops varying from a few individuals to as many as fifty. Singularly enough, it is never known to associate with other birds, but, preferring quadrupeds, is often found in company with the zebra, the springbok, the gnou, &c. Indeed, in many respects it bears a striking resemblance to four-footed animals, such as in its strong, jointed legs and cloven hoofs, its long, muscular neck, its gruff voice, the absence of the elevated central ridge of the breast bone, so generally characteristic of birds, besides other similarities already mentioned. But, perhaps, when compared with the camel, the affinity becomes still more striking. Both are "furnished with callous protuberances on the chest and on the abdomen, on which they support themselves when at rest, and they both lie down in the same manner." In both, the feet and stomach are somewhat similarly constructed; and if we add to this their capabilities of subsisting on a scanty and stunted vegetation, their endurance of thirst, and their formation in general,

260 EASILY DOMESTICATED—CHASE ON HORSEBACK.

which enables ostrich and camel to inhabit and traverse arid and desert regions, the resemblance is by no means so imaginary as one might at first suppose. Indeed, to many of the nations of the East,* as well as to the Romans and the Greeks, the ostrich was known by the name of the camel-bird.

The ostrich is easily domesticated, but is sometimes of a vicious disposition. The Rev. Mr. Hahn, if I remember rightly, told me that some of these birds, which he kept in confinement for a considerable period, became so mischievous that, lest they might injure any of the people on the station, he was obliged to kill them.

TROOPS OF LIONS—FLIGHTS OF KITES. 267

These were glorious times for the lions, who were exceedingly numerous. On passing Tincas and Onanis, both famous strongholds for this animal, we started troops of them among the broken ground, but they invariably ran away, and all my efforts to get a shot at them were unavailing.

One day, while refreshing ourselves and cattle in the midst of a scene like that just described, the men being busy cutting up, or "dressing," as butchers would say, two fine oryxes, the produce of the morning hunt, we were suddenly surrounded by a cloud of kites. The actions of these birds

were most strange. Hovering within a few feet of our heads, they eyed us steadily for a while, and then took themselves off as if satisfied. Another batch would now approach so near that, in order to avoid coming in contact with us, they threw themselves on their backs, spreading out their wings and talons, and opening their beaks, while one or two actually, with a swoop, snatched the food out of the hands of the natives. It was only after having brought down several with the rifle that the rest thought best to keep at a more respectful distance.*

This day, and during the whole of the following, we encountered myriads of lemon-colored butterflies. Their num-

* Several well-known Australian explorers make mention of similar occurrences with this identical bird. I have also heard that in India it is no unusual thing to see hawks snatch the food from a person as he travels along.

268 SINGULAR ATTACHMENT—MRS. RATH.

bers were so great that the sound caused by their wings resembled the distant murmuring of waves on the sea-shore. They always passed in the same direction as the wind blew, and, as numbers were constantly alighting on the flowers, their appearance at such times was not unlike the falling of leaves before a gentle autumnal breeze.

Every day, at the halting-place, we were in the habit of training some oxen to the "pack" or the saddle. One of the animals particularly captivated my fancy, and I was desirous of having him well broken-in. After a little time, however, I learned that no person dared any longer to approach the beast. On inquiring the cause, I found that a large ox had taken it under his protection, so to speak, and would allow no one to go near it. Whenever the servants attempted to catch the *protégé*, his protector would rush at them furiously; and my favorite was so well aware of this, that as soon as he saw any one approaching, he would run directly to his "father," as the natives not inaptly styled the big ox. After having personally convinced myself of this singular attachment, and dreading that some serious mischief might ensue, I deemed it prudent to kill my poor pet. For many days the "father" appeared inconsolable at his loss.

384 MR. OSWELL WOUNDED—A CROTCHET.

We are fond of the marvelous. It is generally received as a fact that the hide of the rhinoceros is impenetrable to a bullet, or even to an "iron ingot," as a certain writer quaintly expresses it. But this is just as idle a notion, as regards the African species at least, as that entertained respecting the softness and pliability of the animal's horns, for a common leaden ball will find its way through the hide with the greatest facility. It is true, one should be near the brute; for, though I have known a rhinoceros killed at the distance of a hundred yards, it is an exception to the rule. Indeed, beyond thirty or forty paces one can not make sure of the shot. Under all circumstances, a double charge of powder is desirable.

THE PAINT TO AIM AT—SELDOM BLEEDS EXTERNALLY. 385

Though a common leaden ball may do the work well enough, I would not recommend it. The best metal is spel-

ter, which has almost the hardness of iron, with all the weight of lead; but it is often difficult to procure. For want of a better, two thirds lead and one third solder answers the purpose very well.

The most deadly part to aim at is just behind the shoulder; a ball through the centre of the lobes of the lungs is certain to cause almost instantaneous death. From the very solid structure of the head, the great thickness of the hide on that part, the position of the horns, the smallness of the brain,* a shot in the head rarely or never proves fatal. The same may be said of the breast.

424 THE NGAMI—WHEN DISCOVERED—NAMES.

The cause of all these failures was chiefly to be found in the desert and inhospitable regions which lie between the explorers and the supposed lake, commonly known as the Kalahari desert. Toward the close of 1849, however, and when the hope of our being able to overcome this apparently insurmountable barrier was almost extinguished, the great object was accomplished by the persevering exertions of Messrs. Oswell, Livingstone, and Murray, and the existence was made known of a fine fresh-water lake in the centre of South Africa.

• • •

The Lake goes with the natives by different names—all of which are more or less appropriate—such as *Inghabé* (the giraffe); *Noka eu Botlletle* (lake of the Botlletle); *Noka ea Mokorin* (lake of boats); and *Ngami*, or *The Waters*. As the last designation is the one by which the Lake is best known to Europeans, I will retain it throughout the remainder of this narrative.

SIZE AND FORM OF THE LAKE.

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The whole circumference is probably about sixty or seventy geographical miles; its average breadth is seven miles, and not exceeding nine at its widest parts. Its shape, moreover, is narrow in the middle and bulging out at the two ends; and I may add, that the first reports received many years ago from the natives about the Lake, and which concurred in representing it of the shape of a pair of spectacles, are correct.

THE
VIVIPAROUS QUADRUPEDS
OF
NORTH AMERICA.

BY
JOHN JAMES AUDUBON, F.R.S., &c., &c.
AND
THE REV. JOHN BACHMAN, D.D., &c., &c.

VOL. I.

NEW-YORK:
PUBLISHED BY J. J. AUDUBON.

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ARCTOMYS MONAX.—LINN.

WOOD-CHUCK. MARYLAND MARMOT. GROUND-HOG.

SYNONYMES.

- MUS MONAX, Linn., 12 ed., p. 81.
 MARYLAND MARMOT, Penn., Arct. Zool., vol. I., p. 111.
 MONAX, ou MARMOTTE DE CANADA, Buff., Supp., 111.
 MARYLAND MARMOT, Godman, Nat. Hist. vol. ii., p. 100, figure.
 MARYLAND MARMOT, Griffiths' Cuvier, vol. iii., p. 130, figure.

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- QUEBEC MARMOT, Pennant, Hist. Quad., 1st ed., No. 259.
 MUS EMPETRA, Pallas, Glir., p. 75.
 ARCTOMYS EMPETRA, Salt, Linn., Trans., vol. xiii., p. 24.
 ARCTOMYS EMPETRA, Godman, Nat. Hist., vol. ii., p. 208.
 ARCTOMYS MONAX, et ARCTOMYS EMPETRA, Sabine, Trans. Linnæan Soc., vol. xiii., pp. 582, 584.
 ARCTOMYS EMPETRA, Richardson, Fauna Boreali Americana, p. 147, pl. 9.

COLOUR.

The specimens before us present several striking varieties of colour; among them is one from Lower Canada, coal-black with the exception of the nose and a patch under the chin, which are light gray; the fur is short, and very soft; and the tail less distichous than in other varieties of this species.

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HABITS.

In the Middle States many individuals of this species seem to prefer stony places, and often burrow close to or in a stone wall. When this is the case, it is very difficult to procure them, as they are secure from the attacks of dogs, and much labour would be necessary in removing the large stones, and digging up the earth in order to dislodge them.

From our own observations, we are obliged to contradict the following account given of the habits of this species. It has been said that "when about to make an inroad upon a clover field, all the marmots resident in the vicinity, quietly and cautiously steal towards the spot, being favoured

in their march by their gray colour, which is not easily distinguished.

"While the main body are actively engaged in cropping the clover heads, and gorging their '*ample cheek-pouches*,' one or more individuals remain at some distance in the rear as sentinels. These watchmen sit erect, with their fore-paws held close to their breast, and their heads slightly inclined, to catch every sound which may move the air. Their extreme sensibility of ear enables them to distinguish the approach of an enemy long before he is sufficiently near to be dangerous, and the instant the sentinel takes alarm, he gives a clear shrill whistle, which immediately disperses the troop in every direction, and they speedily take refuge in their deepest caves. The time at which such incursions are made is generally about mid-day, when they are less liable to be interrupted than at any other period, either by human or brute enemies," (GODMAN, American Natural History, vol. ii., p. 102.)

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The old female, when approached, opened her mouth, showed her teeth, and made a rattling or clattering noise with the latter, evidently in anger. Neither the female nor the young appeared to become in any degree tame during the period we kept them. The former frequently emitted a shrill whistle-like noise, which is a note of alarm and anger, and may be heard when one is at a distance of about fifty yards from the animal. After we had made figures from those specimens, we examined their mouths, but did not find any pouches like those described by Dr. GODMAN, although there appeared to be a cavity, not larger than would admit a common green pea, and which was the only trace of any thing like a pouch in those we procured, and in all that have been observed by us.

When the Wood-Chuck is feeding, it keeps its erect position, inclining the head, and fore-part of its body forward and sideways, so as to reach its food without extending the fore-legs and feet, which are drawn back under it; after getting a mouthful, it draws back its head again and brings its body to an upright posture by the muscular power of the hind-legs and feet. On being surprised or pursued, this species runs very fast for some eight or ten yards, and then frequently stops short and squats down close to the ground, watching to see if it has been observed; and will allow you to approach within a few feet, when it starts suddenly again, and again stops and squats down as before. Not unfrequently, under these circumstances it puts its head under the dry leaves, or amid

tufts of grass, to conceal itself from the pursuer. You may then generally capture or kill it with a stick. These animals bite severely, and defend themselves fiercely, and will, when unable to escape, turn and make battle with a dog of more than double their own size. Sometimes whilst they were lying down as if asleep, we have heard them make the clattering noise before spoken of, with their teeth; reminding us of a person's teeth chattering in an ague fit. When walking leisurely, they place their feet flat upon the ground at full length, arching the toes, however, as is the habit of squirrels. These Marmots sleep during the greater part of the day, stealing from their burrows early in the morning and towards evening. They climb trees or bushes awkwardly, and when they have found a comfortable situation in the sunshine, either on the branch of a tree, or on a bush, will remain there for hours.

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This species becomes torpid about the time the leaves have fallen from the trees in the autumn, and the frosty air gives notice of the approach of winter; and remains burrowed in the earth until the grass has sprung up and the genial warmth of spring invites it to come forth.

We once observed one sunning itself at the mouth of its burrow, on the 23d of October, in the State of New-York; and in the same State, saw one killed by a dog on the first of March, when the winter's snow was yet lying in patches on the ground.

Where the nature of the country will admit of it, the Wood-Chucks select a projecting rock, in some fissure under which, they can dig their burrows. In other localities they dig them on the sides of hills, or in places where the surface of the ground is nearly level. These burrows or excavations are sometimes extended to the length of twenty or thirty feet from the opening; for the first three or four feet inclining obliquely downward, and the gallery being continued farther on, about on a level, or with a slight inclination upward to its termination, where there is a large round chamber, to which the occupants retire for rest and security, in which the female gives birth to her young, and where the family spends the winter in torpidity.

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May we here be allowed to detain you, kind reader, for a few moments, whilst we reflect on this, one among thousands of other instances of the all-wise dispensations of the Creator. Could any of the smaller species of quadrupeds, incapable, as many of them are, of migrating like the swift-winged inhabitants of the air to the sunny climes of the South, and equally unable to find any thing to subsist on among the dreary wastes

of snow, or the frost-bound lands of the North during winter, have a greater boon at the hands of Nature than this power of escaping the rigours and cold blasts of that season, and resting securely, in a sleep of insensibility, free from all cravings of hunger and all danger of perishing with cold, till the warm sun of spring, once more calls them into life and activity? Thus this and several other species of quadrupeds, whose organization in this respect differs so widely from general rules, may be said to have no winter in their year, but enjoy the delightful weather of spring, summer, and autumn, without caring for the approach of that season during which other animals often suffer from both cold and hunger.

"Whilst hunting one day, (said a good friend of ours, when we were last in Canada,) I came across a Wood-Chuck, called in Canada by the different names of Siffleur, Ground-Hog, and occasionally Marmot, with a litter of six or seven young ones by her side. I leaped from my horse, feeling confident that I could capture at least one or two of them, but I was mistaken; for the dam, which seemed to anticipate my evil designs, ran round and round the whole of her young 'chucks,'

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urging them towards a hole beneath a rock, with so much quickness—energy, I may call it—that ere I could lay hands on even one of her progeny, she had them all in the hole, into which she then pitched herself, and left me gazing in front of her well-secured retreat, thus baffling all my exertions!"

In the month of May, or sometimes in June, the female brings forth her young, generally four or five in number. We have however on two occasions, counted seven, and on another eight, young in a litter. In about three weeks, they may be seen playing around the mouth of the

burrow, where sitting on their hind-feet in the manner of the Kangaroo, they closely watch every intruder, retreating hastily into the hole at the first notes of alarm sounded by the mother.

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GEOGRAPHICAL DISTRIBUTION.

We have found the Wood-Chuck in every state of the Union north-east of South Carolina, and throughout the Canadas, Nova Scotia, and New Brunswick. We have also a specimen from Hudson's Bay; but perhaps

it is nowhere more plentiful than on the upper Missouri River, where we found its burrows dug in the loamy soil adjoining the shores, as well as in the adjacent woods. It is not found in the maritime districts either of North or South Carolina, but exists very sparingly in the mountainous regions of those states. We have also traced it along the eastern range of the Rocky Mountains as far south as Texas. A Marmot exists in California resembling the present species very nearly, but which will probably prove distinct from the latter, a point which time and a greater number of specimens must determine.

38

GENUS SCIURUS.—LINN., ERXLEB., CUV., GEOFF., ILLIGER.

The squirrel is admirably adapted to a residence on trees, for which nature has designed it. Its fingers are long, slender and deeply cleft, and its nails very acute and greatly compressed; it is enabled to leap from branch to branch, and from tree to tree, clinging to the smallest twigs, and seldom missing its hold. When this happens to be the case, it has an instinctive habit of grasping in its descent at the first object which may present itself, or if about to fall to the earth, it spreads itself out in the manner of the flying squirrel, and thus by presenting a greater resistance to the air, is enabled to reach the ground without injury, and recover itself so instantaneously, that it often escapes the teeth of the dog that watches its descent, and stands ready to seize upon it at the moment of its fall. It immediately ascends a neighbouring tree, emitting very frequently a querulous bark, which is either a note of fear or of triumph.

All our American species of this genus, as far as we have been able to

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become acquainted with their habits, build their nests either in the fork of a tree, or on some secure portion of its branches. The nest is hemispherical in shape, and is composed of sticks, leaves, the bark of trees, and various kinds of mosses and lichens. In the vicinity of these nests, however, they have a still more secure retreat in some hollow tree, to which they retire in cold or in very wet weather, and where their first litter of young is generally produced.

Several species of squirrels collect and hide away food during the abundant season of autumn, to serve as a winter store. This hoard is composed of various kinds of walnuts and hickory nuts, chesnuts, chinque-

pins, acorns, corn, &c., which may be found in their vicinity. The species, however, that inhabit the Southern portions of the United States, where the ground is seldom covered with snow, and where they can always derive a precarious support from the seeds, insects, and worms, which they scratch up among the leaves, &c., are less provident in this respect; and of all our species, the chickaree, or Hudson's Bay squirrel, (*Sc. Hudsonius*.) is by far the most industrious, and lays up the greatest

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The generic name *Sciurus* is derived from the Latin *sciurus*, a squirrel, and from the Greek, *επισκοπος*, (*skiurops*.) from *σκια*, (*skia*.) a shade, and *οψα*, (*opsa*.) a tail.

There are between sixty and seventy species of this genus known to authors; about twenty well determined species exist in North America.

44

GENUS VULPES.—CUV.

Animals of this genus, generally are smaller, and the number of species known, greater, than among the wolves; they diffuse a fetid odour, dig burrows, and attack none but the weaker quadrupeds, or birds, &c.

The characters of this genus, differ so slightly from those of the genus *Canis*, that we were induced to pause before removing it from the sub-genus in which it had so long remained. As a general rule, we are obliged to admit that a large fox is a wolf, and a small wolf may be termed a fox. So inconveniently large, however, is the list of species in the old genus *Canis*, that it is, we think, advisable to separate into distinct groups, such species as possess any characters different from the true Wolves.

Foxes, although occasionally seen abroad during the day, are nocturnal in their habits, and their character is marked by timidity, suspicion and cunning. Nearly the whole day is passed by the Fox in concealment, either in his burrow under ground, in the fissures of the rocks, or in the middle of some large fallen-tree-top, or thick pile of brush-wood, where he is well hidden from any passing enemy.

During the obscurity of late twilight, or in the darkness of night, he sallies forth in search of food; the acuteness of his organs of sight, of smell, and of hearing, enabling him in the most murky atmosphere, to trace and follow the footsteps of small quadrupeds or birds, and pounce upon the hare scated in her form, or the partridge, grouse, or turkey on their nests.

In the Northern States, such as Pennsylvania and New-York, and in New England, the rutting season of the Fox commences in the month of February. During this period he issues a succession of rapid yells, like the quick and sharp barking of a small dog. Gestation continues from 60 to 65 days. The cubs are from 5 to 9 in number, and like young puppies, are born with hair, and are blind at birth. They leave their burrows generally, when three or four months old, and in all predatory expeditions, each individual goes singly, and plunders on his own account, and for his own especial benefit.

The Generic name is derived from the Latin word *vulpes*, a Fox.

There are about twelve well-known species belonging to this Genus—four of which exist in North America.

64

GENUS TAMIAS.—ILLIGER.

This genus differs from *Sciurus* in several important particulars. The various species that have been discovered, have all the same characteristics, and strongly resemble each other in form, in their peculiar markings, and in their habits. In form they differ from the true squirrels, and approach nearer to the spermophiles; they have a sharp, convex, nose, adapted to digging in the earth; they have longer heads, and their ears are placed farther back than those of the former. They have a more slender body and shorter extremities. Their ears are rounded, without any tufts on the borders or behind them. They have cheek-pouches, without which all squirrels are destitute; their tails are roundish, narrow, seldom turned up, and only sub-distichous.

The species belonging to this genus are of small size, and are all longitudinally striped on the back and sides.

Their notes are very peculiar; they emit a chipping clucking sound differing very widely from the quacking chattering cry of the squirrels.

They do not mount trees unless driven to them from necessity, but dig burrows, and spend their nights and the season of winter under ground.

They are, however, more closely related to the squirrels than to the spermophiles. The third toe from the inner side is slightly the longest, as in the former; whilst in the latter, the second is longest, as in the marmots. The genus *Tamias* is therefore nearly allied to the squirrels, whilst the spermophiles approach the marmots.

The word *Tamias* is derived from the Greek *Tamias*, (*tamias*) a keeper of stores—in reference to its cheek-pouches.

One species of this genus exists in the Northern portions of the Eastern continent; four in North, and one in South, America. We also possess an undescribed species, the habitat of which is at present unknown to us.

TAMIAS LYSTERI.—RAY.

CHIPPING SQUIRREL, HACKEE, &c.

SYNONYMS.

ECUREUIL SUISSE, Sagard Theodat, Canada, p. 746, A. D. 1636.

GROUND SQUIRREL, Lawson's Carolina, p. 124.

" *Catesby*, Carol. vol. ii., p. 75.

EDWARDS, vol. iv., p. 181. Kalm, vol. i., p. 322.

SCIURUS LYSTERI, Ray, Synops. Quad., p. 216, A. D. 1693.

LE SUISSE, Charlevoix, Nouv. Fr., vol. v., p. 196.

STRIPED DORMOUSE, Pennant, Arc. Zool., 4 vols., vol. i., p. 126.

SCIURUS CAROLINENSIS, Brisson, Reg. Anim., p. 155, A. D. 1756.

ECUREUIL SUISSE, (Desm. Enc. Mamm.,) Nola, p. 339, Esp., 547.

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SCIURUS STRIATUS, Harlan, Fauna, p. 183.

" *Godman*, Nat. Hist., vol. ii., p. 142.

SCIURUS (TAMIAS) LYSTERI, Rich., F. B. A., p. 181, plate 15.

" *" Doughty's Cabinet Nat. Hist.*, vol. i., p. 169, pl. 15.

SCIURUS STRIATUS, DeKay, Nat. Hist. of N. Y., part 1, p. 62, pl. 16, fig. 1.

There are some varieties observable among specimens procured in different States of the Union. We have noted it, like the Virginian deer, becoming smaller in size as it was found farther to the South. In Maine and New Hampshire, it is larger than in the mountains of Carolina and Louisiana, and the tints of those seen at the North were lighter than the colouring of the Southern specimens we have examined. We possess an albino, sent to us alive, snow-white, with red eyes; and also another specimen jet-black. We have, however, found no intermediate varieties, and in general we may remark that the species of this genus are not as prone to variations in colour as those of the true Squirrels.

There was about a gill of wheat and buckwheat in the nest; but in the galleries we afterwards dug out, we obtained about a quart of the beaked hazel nuts, (*Corylus rostrata*), nearly a peck of acorns, some grains of Indian corn, about two quarts of buckwheat, and a very small quantity of grass seeds. The late Dr. JOHN WRIGHT, of Troy, in an interesting communication on the habits of several of our quadrupeds, informs us, in reference to this species, that "It is a most provident little creature, continuing to add to its winter store, if food is abundant, until driven in by the severity of the frost. Indeed, it seems not to know when it has enough, if we may judge by the surplus left in the spring, being sometimes a peck of corn or nuts for a single Squirrel. Some years ago I watched one of these animals whilst laying up its winter store. As there were no nuts to be found near, I furnished a supply. After scattering some hickory nuts on the ground near the burrow, the work of carrying in was immediately commenced. It soon became aware that I was a friend, and approached almost to my feet for my gifts. It would take a nut from its paws, and dextrously bite off the sharp point from each end, and then pass it to its cheek-pouch, using its paws to shove it in, then one would be placed on the opposite side, then again one along with the first, and finally, having taken one between its front teeth, it would go into the burrow. After remaining there for five or ten minutes it would reappear for another load. This was repeated in my presence a great number of times, the animal always carrying four nuts at a time, and always biting off the asperities."

We perceive from hence, that the Chipping Squirrels retire to winter quarters, in small families, in the early part of November, sooner or later, according to the coldness or mildness of the season, after providing a store of food in their subterranean winter residence. When the snows are melted from the earth in early spring, they leave the retreat to which they had resorted during the first severe frosts in autumn. We have seen them sunning themselves on a stump during warm days about the last of February, when the snows were still on the earth here and there

in patches a foot deep; we remarked, however, that they remained only for half an hour, when they again retreated to their burrows.

The young are produced in May, to the number of four or five at a birth, and we have sometimes supposed from the circumstance of seeing a young brood in August, that they breed twice a year.

Several species of hawks are successful in capturing the Chipping Squirrel. It furnishes also many a meal for the hungry fox, the wild cat, and the mink; but it possesses an enemy in the common weasel or ermine, (*mustela erminea*) more formidable than all the rest combined. This blood-thirsty little animal pursues it into its dwelling, and following it to the farthest extremity, strikes its teeth into its skull, and like a cruel savage of the wilderness, does not satiate its thirst for blood, until it has destroyed every inhabitant of the burrow, old and young, although it seldom devours one fifth of the animals it so wantonly kills. We once observed one pursue a Chipping Squirrel into its burrow. After an interval of ten minutes it reappeared, licking its mouth, and stroking its fur with its head, by the aid of its long neck. We watched it as it pursued its way through a buckwheat field, in which many roots and stumps were yet remaining, evidently in quest of additional victims. On the following day we were impelled by curiosity to open the burrow we had seen it enter. There we found an old female ground squirrel, and five young, half-grown, lying dead, with the marks of the weasels' teeth in their skulls.

GEOGRAPHICAL DISTRIBUTION.

The Chipping Squirrel has a pretty wide geographical range. It is common on the northern shores of Lakes Huron and Superior; and has

been traced as far as the fiftieth degree of north latitude. In the Eastern, Northern, and Middle States, it is quite abundant; it exists along the whole of the Alleghany range, and is found in the mountainous portions of South Carolina, Georgia, and Alabama. In the alluvial districts of Carolina and Georgia, it disappears. We have never found it nearer the seaboard of South Carolina than at Columbia, one hundred and ten miles from Charleston, where it is very rare. It is found in Tennessee and throughout Louisiana.

GENERAL REMARKS.

Two of our American naturalists, HARLAN and GODMAN, supposed that it was the Asiatic species, the *S. striatus* of KLEIN, PALLAS, SCHREBER, and other authors; Dr. RICHARDSON (1829) believed that the descriptions given of *Sciurus striatus*, did not exactly correspond with American specimens, and as he had no opportunity of instituting a comparison, he adopted the specific name of RAY, *Sciurus* (TAMIAS) *Lysteri*, for our species;

and quoted what PALLAS had written in regard to the habits of the Asiatic animal, as applying to those of our little Chipping Squirrel. Very recently (1842) Dr. DEKAY, in the work on American quadrupeds, published by order of the State of New York, has again referred it to *S. striatus* of LINNÆUS, and endeavoured to prove the identity of the two species, from European writers. We suspect he had no opportunity of making a comparison from actual specimens.

Reasoning from analogy in regard to the species of birds, or quadrupeds, found to be identical on both continents, we should be compelled to admit that if our species is the *S. striatus* of Asia, it presents a solitary exception to a long-established general rule.

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GENUS SCALOPS.—CUVIER.

The name Scalops is derived from the Greek *σκαλῶν*, (*skallō*), and from the Latin *scalpo*, I scrape.

The various species included in this genus, which approaches very closely to the genus TALPA, of Europe, (European mole,) are, we believe, confined to North America. There are, so far as we have been informed, only five species known at the present time.

In the lower, or inferior jaw, sixteen teeth; the two posterior incisors very small, succeeded on each side by another, much larger, pointed, and extending forward; three false-molars which succeed these, are pointed, and the third and largest, slightly lobed; three true molars composed of two parallel prisms, terminated each by three points, and "presenting one of their angles on the outer side, and one of their faces on the internal surface; the two first of equal size, the other somewhat smaller." Part of the above description is in the words of Dr. GODMAN, from his very correct and interesting article on the Shrew Mole, (vol. i., p. 82,) which corresponds exactly with the results of our own investigations of the teeth of this animal, made at various times, during a period of several years.

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On the inside of the thighs, near the tail, is a gland, about half an inch long, from which a disagreeable musky odour issues, which makes the animal offensive to delicate olfactories. All our other shrew moles, possess similar glands, and we have perceived the musky smell still remaining strong in skins that had been prepared and stuffed several weeks.

There are many variations in the coloring of different individuals of this species, but none of them permanent: we possess some specimens which are nearly black, and others of a light cream-colour; we also have a specimen, the tail of which, is clothed with short hairs, with a considerable tuft at the extremity. From these, and similar differences in various other animals, it is not surprising that authors have described in their works, many as new, which on being closely examined afterwards prove to be mere accidental varieties of some well-known species.

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We were much interested in observing that no matter how soiled its coat might have become in the cage, it would resume its beauty and glossiness after the mole had passed and re-passed through the earth, eight or ten times, which it always accomplished in a few minutes. We frequently remarked with surprise the great strength of this animal, which enabled it to lift the lid or top of a box in which it was kept although it was large and heavy; the box-top was not however fastened down. Seating ourselves quietly in the room, after putting back the mole into the box, the animal supposing itself no longer watched, very soon raised its body against the side of the box, which was partly filled with earth, and

SCALOPS AQUATICUS.—LINN.

COMMON AMERICAN SHREW MOLE.

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SYNONYMES.

- SOREX AQUATICUS, Linn. Syst. Nat., 12th ed. corrected, vol. i., p. 74.
- TALPA FUSCA, Pennant, Brit. Zool., Quadrupeds, 314.
- SCALOPS CANADENSIS, Desm., Mam., p. 115.
- SCALOPE DE CANADA, Cuv., Règne Animal, p. 134.
- SHREW MOLE, Godman, Nat. Hist., vol. i., p. 84, pl. 5, fig. 3.
- SCALOPS CANADENSIS, Harlan, Fauna, p. 32. Young.
- " PENNSYLVANICA, Harlan, Fauna, p. 33. Adult.
- " CANADENSIS, Emmons, Report on Quads. of Mass., p. 15.
- " AQUATICUS, Bachman, Observations on the Genus Scalops, Boston Jour. Nat. Hist., vol. iv., No. 1., p. 28, 1842.
- " AQUATICUS, Dekay, Nat. Hist. of the State of New York, p. 15.

presently its snout was protruded through the small space between the box and the cover; and after a few efforts the creature got his fore-feet on to the edge of the box, raised itself over the latter, and fell upon a table on which we had placed the box. It immediately ran to the edge of the table, and thence tumbled on to the floor; this, however, did not at all inconvenience it, for it made off to a dark corner of the room at once, and remained there until again replaced in its prison.

When this Mole was fed on earth-worms, (*Lumbricus terreus*), as we have just related, we heard the worms crushed in the strong jaws of the animal, with a noise somewhat like the grating of broken glass, which was probably caused by its strong teeth gnashing on the sand or grit contained in the bodies of the worms. These were placed singly on the ground near the animal, which after smelling around for a moment turned about in every direction with the greatest activity, until he felt a worm, when he seized it between the outer surface of his hands or fore-paws, and pushed it into his mouth with a continually repeated forward movement of the paws, cramming it downward until all was in his jaws.

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It is this extraordinary muscular power in the fore-paws and arms, that enables the Shrew Moles to traverse the galleries they excavate, with so much rapidity, in doing which they turn the backs of their palms or hands toward each other, push them forward as far as the end of their snout, and then open and bring them round backward, in the manner of a person moving his hands and arms when swimming. When running along on the surface of the ground, they extend the fore-legs as far forward as they will reach, turning the backs of the hands or paws (as just mentioned) towards each other, and placing them edge-wise, instead of flat on the earth as might be supposed, and in this manner they run briskly, and without any awkward movement, crossing beaten-roads, or paved walks, and sometimes running swiftly twenty or thirty feet before they can get into the ground.

Although generally known to run through the same galleries often, so much so, that the most common method of capturing them, is to set a trap anywhere in one of these tracks, to intercept them when again passing through it, we have known a trap to remain set in a fresh track for eleven days before the animal passed that way, when it was caught; and we are of opinion that many of their tracks are only passed through once, as this animal is known to travel from one field or wood to another, and probably the only galleries they regularly traverse, are those adjacent to the

spot they have selected for rearing their young. In relation to this subject, Dr. GODMAN says—

“It is remarkable how unwilling they are to relinquish a long frequented burrow; I have frequently broken down, or torn off the surface of the same burrow for several days in succession, but would always find it repaired at the next visit. This was especially the case with one individual

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whose nest I discovered, which was always repaired within a short time, as often as destroyed. It was an oval cavity, about five or seven inches in length, by three in breadth, and was placed at about eight inches from the surface in a stiff clay. The entrance to it sloped obliquely downwards from the gallery about two inches from the surface; three times I entirely exposed this cell, by cutting out the whole superincumbent clay with a knife, and three times a similar one was made a little beyond the situation of the former, the excavation having been continued from its back part. I paid a visit to the same spot two months after capturing its occupant, and breaking up the cell, all the injuries were found to be repaired, and another excavated within a few inches of the old one. Most probably numerous individuals, composing a whole family, reside together in these extensive galleries. In the winter they burrow closer to the streams, where the ground is not so deeply frozen.”

This species whilst beneath the earth's surface, seems to search for food with the same activity and untiring perseverance that are observable in animals that seek for their provender above ground. It works through the earth, not only in a straight-forward direction, but loosens it to the right and left, beneath and above, so that no worm or insect can escape it. When in contact with any one of the objects of which it has been in search, it seizes it with remarkable quickness both with its fore-feet and its sharp teeth, drawing itself immediately backward with its prize, upon which it begins to prey at once. The Shrew Mole passes through loose soil, with nearly the same ease and speed that it displays in running, or “scrabbling” along above ground. It moves backward almost as rapidly as it goes forward. The nose is often seen protruded above the surface of the ground.

Although this species, as we have seen, feeds principally on worms, grubs, &c., we have the authority of our friend OGDEN HAMMOND, Esq., for the following example either of a most singular perversity of taste, or of habits hitherto totally unknown as appertaining to animals of this genus,

and meriting a farther inquiry. While at his estate near Trog's Neck, on Long Island Sound, his son, who is an intelligent young lad, and fond

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of Natural History, observed in company with an old servant of the family, a Shrew Mole in the act of swallowing, or devouring, a common toad—this was accomplished by the Mole, and he was then killed, being unable to escape after such a meal, and was taken to the house, when Mr. HAMMOND saw and examined the animal, with the toad partially protruding from its throat.

They have been known to make a fresh track, after rain, during one night, several hundred yards in length—oftentimes they proceed for a considerable distance, in nearly a straight or direct line, then suddenly begin to excavate around and across a small space of not more than a few feet in diameter, until you could hardly place your foot on a spot within this subterranean labyrinth, without sinking through into their track; at this time they are most probably in pursuit of worms, or other food, which may be there imbedded.

Although cold weather appears to us, to put a stop to the movements of the Mole, we do not feel by any means certain that such is the case; and very probably the hardness of the ground when frozen, and the depth at which the Mole is then obliged to seek his food, may be a sufficient reason for our seeing no traces of this busy creature's movements during cold winter weather. We have, however, often perceived their tracks after a

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day or two of warm weather in January, and have repeatedly observed them about during a thaw, after the first autumnal frosts had occurred. In Carolina there are not many weeks in a winter in which we are not able to find here and there traces of the activity of the Mole. We admit, however, that even in this comparatively mild climate, they appear to be far less active in winter than at other seasons.

From the foregoing facts we are inclined to think the Mole does not become torpid at any time; and in corroboration of this idea, we find that the animal is not at any season found in high Northern latitudes. Dr. RICHARDSON thinks "the absence of the Shrew Mole from these countries is owing to the fact that the earth-worm on which the Scalops, like the common Mole, principally feeds, is unknown in the Hudson's Bay countries."

The idea commonly entertained by uninformed persons, that Moles have no eyes, is an error; although our own experience confirms the opinion of others, that they appear to possess the power of seeing only in a very limited degree. We must not forget, however, that a wise Providence has adapted their organs of vision to the subterraneous life they lead. Shut out from the light of the sun by a law of nature requiring them to search for food beneath the earth's surface, these animals would find a large pair of eyes one of the greatest of evils, inasmuch as they would be constantly liable to be filled with sand; thus causing inflammation, blindness, and eventually death.

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We had an opportunity on two different occasions of examining the nests and young of the Shrew Mole. The nests were about eight inches below the surface, the excavation was rather large and contained a quantity of oak leaves on the outer surface, lined with soft dried leaves of the crab-grass, (*Digitaria sanguinalis*.) There were galleries leading to this nest, in two or three directions. The young numbered in one case, five, and in another, nine.

Our kind friend, J. S. HAINES, Esq., of Germantown, near Philadelphia, informed us that he once kept several Shrew Moles in confinement for the purpose of investigating their habits, and that having been neglected for a few days, the strongest of them killed and ate up the others; they also devoured raw meat, especially beef, with great avidity.

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GEOGRAPHICAL DISTRIBUTION.

The Shrew Mole is found inhabiting various parts of the country from Canada to Kentucky, in considerable numbers, and is abundant in Carolina, Georgia, Louisiana, and Florida. It is, according to RICHARDSON, unknown in Labrador, the Hudson's Bay Territories, and probably North of Latitude 50°. We did not see any of them in our trip up the Missouri river, and there are none to be found on the dry prairies of the regions immediately east of the great Rocky Mountain chain. The figures in our plate were drawn from specimens procured near the City of New York. We mention this locality, because the colours differ a little from others that we have seen, and that have been described.

LEPUS AMERICANUS.—ERXLEBEN.

NORTHERN HARE.

SYNONYMES

- LIEVRE, (Quenton Malisia,) Sagard Theodat, Canada, p. 747. 1636.
 SWEDISH HARE, Kalin's travels in North America, vol. ii., p. 45. 1749.
 AMERICAN HARE, Philos. Trans., London, vol. lxii., pp. 11, 376. 1772.
 LEPUS AMERICANUS, Erxleben, Syst. regni Animalis, p. 330. 1777.
 " NANUS, Schreber, vol. ii., p. 881, pl. 234, fig.
 " HUDSONIUS, Pallas, Glires, pp. 1, 30.
 VARYING HARE, Pennant, Arct. Zool., vol. i., p. 95.
 LEPUS VIRGINIANUS, Harlan, Fauna, p. 196. 1825.
 " VARIABILIS, var. Godman, Nat. Hist., vol. ii., p. 164.
 AMERICAN VARYING HARE, Doughty, Cabinet Nat. Hist., vol. i., p. 217, pl. 19. Autumn pelage.
 THE NORTHERN HARE, Audubon, Ornithological Biog., vol. ii., p. 469. Birds of America, pl. 181, (in the talons of the Golden Eagle,) Winter pelage.
 LEPUS AMERICANUS, Richardson, Fauna Boreali A., p. 217.
 " VIRGINIANUS, Bach, Acad. Nat. Sciences, Philadelphia, vol. vii., p. 301.
 " AMERICANUS, Bach, Ib., p. 403, and Ib., vol. viii., p. 76.
 " AMERICANUS, Dekay, Nat. Hist. State of New York, p. 95, pl. 26.

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The summer dress of this species is assumed in April, and remains without much change till about the beginning of November in the latitude of Quebec, and till the middle of the same month, in the State of New York and the western parts of Pennsylvania; after which season the animal gains its winter pelage. During winter, in high Northern latitudes, it becomes nearly pure white, with the

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exception of the black edge on the outer borders of the ears. In the latitude of Albany, New York, it has always a tinge of reddish-brown, more conspicuous in some specimens than in others, giving it a wavy appearance, especially when the animal is running, or when the fur is in the least agitated. In the winter season the hair is plumbous at base, then reddish, and is broadly tipped with white. The parts of the body which are the last to assume the white change, are the forehead and shoulders; we have two winter-killed specimens before us that have the forehead, and a patch on the shoulders, brown.

The tail is very short, black above, and grayish-white beneath. The young become white in the autumn of the first year, but assume their winter colouring a little later in the season than the adults. We have met with some specimens in the New York markets, late in January, in which the change of colour was very partial, the summer pelage still predominating.

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Weight:—This species in the beginning of winter varies from three to six and a half pounds, but we consider 5½ pounds to be the average weight of a full-grown animal in good condition.

HABITS.

Our different species of Hares, and more especially the present one and the little gray rabbit, have been so much mixed up in the accounts of authors, that great confusion exists in regard to their habits, and their specific identity. The assertion of WARDEN, that the American Hare retreats into hollow trees when pursued, applies to the gray rabbit, for which it was no doubt intended, but not to the Northern Hare. We are not aware that the latter ever takes shelter either in a hole in the earth, or in a hollow tree. We have seen it chased by hounds for whole days, and have witnessed the repetition of these hunts for several successive winters, without ever knowing it to seek concealment or security in such places. It depends on its long legs, and on the thickness of the woods, to aid it in evading the pursuit of its enemies. When hunted, it winds and doubles among thick clusters of young pines and scrub-oaks, or leads the dogs through entangled patches of hemlock and spruce fir, until it sometimes wearies out its pursuers; and unless the hunter should appear, and stop its career with the gun, it is almost certain to escape.

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The food of this species, in summer consists of various kinds of juicy and tender grasses, and the bark, leaves, and buds, of several small shrubs; and these Hares seem to be particularly fond of the young twigs of the wild allspice, (*Laurus benzoin*.) but in winter, when the earth is covered with snow, they gain a precarious subsistence from the buds and bark of such trees as are suited to their taste. Sometimes they scratch up the snow to feed on the leaves and berries of the various species of *Pyrola*, found in the Northern States. The bark of the willow, birch, and poplar, and the buds of young pines, are sought after by them with avid-

ity. We have seen persons in the Northern part of the State of New York, who were desirous of shooting these animals by moonlight, watching near American black-poplar trees, (*Populus Hudsonica*), which they had cut down for the purpose of attracting them to feed on their buds and tender twigs, in which they were often successful.

The Northern Hare, like most others of the genus, seeks its food only by night or in the early part of the evening. To this habit it is more exclusively confined during autumn and winter, than in spring and summer. In the latter seasons, especially in spring, these animals are frequently observed in the morning, and as the sun is declining, in the afternoon, cautiously proceeding along some solitary by-path of the forest. Two or three may often be seen associated together, appearing full of activity and playfulness. When disturbed on these occasions, they stamp on the ground, making a noise so loud, that it can be heard at some distance, then hopping a few yards into the thicket, they sit with ears erect, seemingly listening, to ascertain whether they are pursued or not. This habit of thumping on the earth, is common to most hares and rabbits. We have particularly noticed it in the domesticated rabbit, (*L. cuniculus*) and in our common gray rabbit. They are more particularly in the habit of doing it on moonlight nights; it is indicative either of fear or anger, and is a frequent action among the males when they meet in combat. During cold weather,

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this Hare retires to its form at early dawn, or shelters itself under the thick foliage of fallen tree tops, particularly those of the pine and hemlock.

Two females which we domesticated, and kept in a warren, produced young, one on the tenth, and the other on the fifteenth, of May; one had four, and the other six leverets, which were deposited on a nest of straw, the inside of which was lined with a considerable quantity of hair plucked from their bodies. They succeeded in rearing all their young but one, which was killed by the male of a common European rabbit.

We, however, think it probable that the females in their wild state, may produce young, twice during the season. Those referred to above, were much harassed by other species which were confined in the same warren, and might therefore have been less prolific than if they had enjoyed their liberty undisturbed, amid the recesses of their native woods.

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As an article of food, this is the most indifferent of all our species of Hares; its flesh is hard, dry, almost juiceless, possessing none of the flavour of the English hare, and much inferior to that of our gray rabbit. Epicures, however, who often regard as dainties dishes that are scarce, and who, by the skilful application of the culinary art, possess means of rendering things savoury that are of themselves insipid, may dispute this point with us.

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This species when caught alive cannot be taken into the hand, like the gray rabbit, with impunity; the latter, when seized by the ears or hind-legs, soon becomes quiet, and is harmless; but the Northern Hare struggles to escape, and makes a formidable resistance with its teeth and nails. On one occasion a servant who was expert at catching the gray rabbit in traps, came to us with a rueful countenance, holding a hare in his hands, exhibiting at the same time sundry severe scratches he had received, showing us his torn clothes, and a place on his leg which the animal had bitten, and declaring that he had caught "a rabbit as cross as a

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cat." We ascertained it to be a Northern Hare, in its summer dress, and although its captor had not been able to distinguish it from the gray rabbit by its colour, he certainly had had a practical lesson in natural history, which he did not soon forget.

GEOGRAPHICAL DISTRIBUTION.

This species is found in portions of the British possessions, as far as the sixty-eighth parallel of North latitude. It is, however, confined to the Eastern portion of our Continent; RICHARDSON, who represents it as "a common animal from one extremity of the Continent to the other," seems to have mistaken for it another species which replaces it on the North West coast. Although it does not range as far to the North as the Polar hare, it is decidedly a Northern species; it is found at Hudson's Bay, in Newfoundland, Canada, all the New-England States, and in the Northern portions of New York, Pennsylvania, and Ohio.

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FIBER ZIBETHICUS.—LINN.

MUSK-RAT.—MUSQUASH.

- Musascus*, Smith's Virginia, 1626. (Pinkerton's Collection of Voyages and Travels, vol. xiii., p. 31.)
Rat Musqué, Sagard Theodat, Canada, p. 771.
CASTOR ZIBETHICUS, Linn. Syst. Nat., xii. ed., vol. 1, p. 79.
L'ONDATEA, Buffon, Tom 10, p. 1.
MUSKRAT, Lawson, Carolina, p. 120.
MUSK BEAVER, Pennant, Arc. Zool., vol. i., p. 106.
MUSQUASH, Hearne, Journey, p. 379.
MOS ZIBETHICUS, Linn., Gmel., vol. i., p. 125.
FIBER ZIBETHICUS, Sabine, Franklin's Journey, p. 659.
MUSK RAT, Godman's Nat. Hist., p. 58.
ONDATHERA, Huron Indians.
MUSQUASH, *WATUSS*, or *WACHUSK*; the animal that sits on the ice in a round form.
Cree Indians, (Richardson.)

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Suddenly it gives the water a smart flap with its tail, somewhat in the manner of the beaver, and disappears beneath the surface instantaneously—going down head foremost—and reminding one of the quickness and ease with which some species of ducks and grebes dive when shot at. At the distance of ten or twenty yards, the Musk-Rat comes to the surface again, and perhaps, joins its companions in their sports; at the same time, others are feeding on the grassy banks, dragging off the roots of various kinds of plants, or digging underneath the edge of the bank.

The burrows, and houses of this species, are not constructed on such admirable architectural principles as those of the beaver, but are, nevertheless, curious, and well-adapted for the residence of the animal. Having enjoyed opportunities of examining them in several portions of the Northern States, and having been present when hundreds of Musk-Rats were taken, either by digging them out, or catching them in traps, we will endeavour to describe their nests, and the manner in which the hunters generally proceed in order to procure the animals that are in them.

In different localities, the Musk-Rat has very opposite modes of constructing its winter domicil. Where there are overhanging clayey or loamy banks along the stream or pond, they form a winter retreat in the side of the bank, with openings under the water, and their galleries run sometimes to the distance of fifteen or twenty yards from the shore, inclining upward, so as to be above the influence of the high waters, on the breaking up of the ice in spring, or during freshets.

There are usually three or four entrances from under the water, which

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all, however, unite at a point, some distance from the water, and sufficiently high to be secure from inundation, where there is a pretty large excavation. In this "central hall" we have seen nests that would fill a bushel basket. They were composed of decayed plants and grasses, principally sedge, (*Carex*.) the leaves of the arrow-head, (*Sagittaria*.) and the pond-lily, (*Nymphaea*.) They always contained several dried sticks, some of them more than a foot in length; these were sometimes arranged along the sides, but more frequently on the top of the nests. From these nests, there are several galleries extending still farther from the shore; into the latter the animals retreat, when, after having been prevented from returning to the water, by stopping the entrances, they are disturbed in their chamber. Sometimes we have found their subterranean strongholds leading into others by transverse galleries. These were never so far beneath the surface, as those of the fox, marmot, or skunk.

There are, occasionally, very differently constructed nests of the Musk-Rat; we have seen some of them, in the town of Clinton, Dutchess county, and along the margins of swamps in the vicinity of Lake Champlain, in the State of New York; and others, in several localities in Canada. A pond supplied chiefly, if not entirely, by springs, and surrounded by low and marshy ground, is preferred by the Musk-Rats; they seem to be aware that the spring-water it contains, probably will not be solidly frozen, and there they prepare to pass the winter. Such a place, as you may well imagine, cannot without great difficulty be approached, until its boggy and treacherous foundation has been congealed by the hard frosts and the water is frozen over; before this time, the Musk-Rats collect coarse grasses and mud, with which, together with sticks, twigs, leaves, and any thing in the vicinity that will serve their purpose, they raise their little

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houses from two to four feet above the water; the entrance being always from below. We have frequently opened these nests, and found in the centre a dry comfortable bed of grass, sufficiently large to accommodate several of them. When the ponds are frozen over, and a slight fall of snow covers the ground, these edifices resemble small hay-cocks. There is another peculiarity that, it appears to us, indicates a greater degree of intelligence in the Musk-Rat than we are usually disposed to award to it. The animal seems to know that the ice will cover the pond in winter, and that if it has no places to which it can resort to breathe, it will be suffo-

cated. Hence you here and there see what are called breathing places. These are covered over with mud on the sides, with some loose grass in the centre to preserve them from being too easily frozen over. We have occasionally seen these winter-huts of the Musk-Rat, in the vicinity of their snug summer retreats in some neighbouring river's bank, and have sometimes been half inclined to suppose, that for some cause or other, they gave a preference to this kind of residence. We are not, however, aware, that these nests are made use of by the Musk-Rat in spring, for the purpose of rearing its young. We believe these animals always for that purpose resort to holes in the sides of ponds, sluggish streams, or dykes.

The fur of this species was formerly a valuable article of commerce, and is still in some demand. But since so many new inventions are supplying the public with cheap hats, and the Nutria skin has been extensively introduced from South America, the Musk-Rat is less sought after, and in some of our most thickly populated districts has greatly increased in numbers.

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In regard to the food of the Musk-Rat, our experience induces us to believe, that like its congener, the house rat, it is omnivorous. In 1813, we obtained two of this species, when very young, for the purpose of domesticating them, in order that we might study their habits.

Their food in summer, consists chiefly of grasses, roots, and vegetables. We have often watched them early in the morning, eating the young grass of the meadows; they seemed very fond, especially of the timothy, (*Phleum pratense*), and red-top, (*Agrostis*); indeed, the few bunches of clover, and other kinds of grass remaining in their vicinity, gave evidence that the Musk-Rats had been at work upon them.

An acquaintance who had a garden in the neighbourhood of a meadow which contained a large number of Musk-Rats, sent one day, to enquire whether we could aid in discovering the robbers who carried off almost every night a quantity of turnips. We were surprised to find on examining the premises, that the garden had been plundered and nearly ruined by these Rats. There were paths extending from the muddy banks of the stream, winding among the rank weeds and grasses, passing through the old worm fence, and leading to the various beds of vegetables. Many of the turnips had disappeared on the previous night—the duck-like tracks

of the Musk-Rats were seen on the beds in every direction.

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The corn-stalks then standing in the garden, were so tall, that the ears could not be reached by the Musk-Rats, and on examining the beds from which they had probably some days previously taken the corn we found in the burrow, we ascertained that the stalks had been gnawed off at the roots.

We have supposed, that a considerable portion of their food in the Northern States in some localities, was the root of the common arrow-head, (*Sagittaria, sagittifolia*), as we have often observed it had been gnawed off, and have found bits of it at the mouths of their holes. We have, also, seen stems of the common Indian turnip, (*Arum triphyllum*), which were cut off, portions of which, near the root, appeared to have been eaten. They also feed on the spice wood, (*Laurus benzoin*.) RICHARDSON says, "they feed in the Northern districts on the roots and tender shoots of the bulrush and reed-mace, and on the leaves of various carices and aquatic grasses." PENNANT says, "they are very fond of the *Acorus verus*, or *Calamus aromaticus*;" and KALM speaks of apples being placed in traps, as a bait for them. Nearly all our writers on natural history, are correct in saying, that fresh water mussels compose a portion of their food.

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Oysters were placed in the cage, which on account of their saltiness, we believed would not be relished; but a week afterwards the shells only were left. We procured a pint of a small species of imported snail, (*Bulimus decollatus*, GMEL., *multilatus*, SAX.) that has become very destructive in many of the gardens of Charleston, and the Musk-Rats immediately began to crush them with their teeth, and in a few days nothing but the broken shells remained. We have, therefore, come to the conclusion, that whilst vegetables are the general food of this species, various kinds of shell-fish, form no inconsiderable portion of it. Our Musk-Rats refused fish, but were like most animals in confinement, fond of bread. They were generally fed on sweet potatoes, parsnips, cabbage, and celerery; the sweet flag, (*Acorus calamus*.) they rejected altogether.

Although the Musk-Rat walks awkwardly, and proceeds so slowly that it can scarcely be said to run, it swims and dives well. We regard it as a better swimmer than the mink, and from its promptness in diving, at the flash of the gun, it frequently escapes from its pursuers. It may,

however, be easily drowned. We once observed several of them which had been driven from their holes, after struggling under the ice for about fifteen minutes rising to the surface; and on taking them out, by cutting holes in the ice, they were found to be quite dead. RICHARDSON speaks of "their being subject at uncertain intervals to a great mortality from some unknown cause." We have no doubt that in very cold winters, when the ice reaches to the bottom of the ponds, and they are confined to their holes, they devour each other, since we have seen many burrows opened in autumn, and except in the instances we have already mentioned, we found no provision laid up for winter use. When a Musk-Rat has been caught by one foot in a trap set on the land, it is frequently found, torn to pieces and partially devoured; and from the tracks around, one might be induced to believe, that, as is the case with porpoises, and many other animals, when one is wounded and cannot escape, its companions turn upon and devour it. When one is shot, and dies in the water, it is very soon carried off by the living ones, if there are any in the vicinity at the time, and is dragged into one of their holes or nests. We have frequently found carcasses of these animals thus concealed, but in these cases the flesh had not been devoured. This singular habit reminds us of the Indians, who always carry their dead off the field of battle when they can, and endeavour to prevent their bodies falling into the hands of their enemies.

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The Musk-Rat has occasionally been known to leave its haunts along the streams and ponds, and is sometimes found travelling on elevated grounds. We were informed by our friend Mr. BARN, that one was caught in a house near Reading, in Pennsylvania, three-quarters of a mile from the water; and the late Dr. WAGNER of Troy, once discovered one making its way through the snow, on the top of a hill, near that city.

The number of young produced at a litter, varies from three to six. RICHARDSON states that they sometimes have seven, which is by no means improbable. They usually have three litters in a season.

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The Musk-Rat is found as far North as the mouth of the Mackenzie river, in latitude 69°, on the Rocky mountains, on the Columbia river, and on the Missouri. With the exception of the alluvial lands in Carolina, Georgia, Alabama, and Florida, it abounds in all parts of the United States north of latitude 30°.

SCIURUS HUDSONIUS.—PENNANT.

HUDSON'S BAY SQUIRREL.—CHICKAREE.—RED-SQUIRREL.

SYNONYMES.

ECUREUIL COMMUN, ou AROUTEN, Sagard Theodat, Canada, p. 746.

COMMON SQUIRREL, Forster, Phil. Trans., vol. lxii., p. 378, 1772.

SCIURUS VULGARIS, var. E. Erxleben, Syst., An. 1777.

SCIURUS HUDSONICUS, Pallas, Glir., p. 377.

SCIURUS HUDSONICUS, Gmel., Linn., ——— 1788.

HUDSON'S BAY SQUIRREL, Penn. Arctic Zool., vol. i., p. 116.

" " " Hist. Quadrupeds, vol. ii., p. 147.

COMMON SQUIRREL, Hearnes' Journey, p. 385.

RED SQUIRREL, Warden's Hist. U. S., vol. i., p. 330.

RED BARKING SQUIRREL, Schoolcraft's Journal, p. 273.

SCIURUS HUDSONICUS, Sabine, Franklin's Journey, p. 663.

" " " Godman, vol. ii., p. 138.

" " " Fischer, Mam., p. 349.

ECUREUIL DE LA BAIE D'HUDSON, F. Cuvier, Hist. Nat. des Mammifères.

SCIURUS HUDSONICUS, Bach. Trans. Zool. Soc., London, 1839.

" " " Dekay, Nat. Hist. New York, 1842.

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The habits of this little Squirrel are, in several particulars, peculiar; whilst the larger Gray Squirrels derive their sustenance from buds and nuts, chiefly inhabit warm or temperate climates, and are constitutionally fitted to subsist during winter on a small quantity of food, the Chickaree exhibits the greatest sprightliness and activity amidst the snows and frosts of our Northern regions and consequently is obliged, during the winter season, to consume as great a quantity of food as at any other. Nature has, therefore, instructed it to make provision in the season of abundance for the long winter that is approaching; and the quantity of nuts and seeds it often lays up in its store-house, is almost incredible. On one occasion we were present, when a bushel and a half of

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shell-barks (*Carya alba*), and chesnuts, were taken from a hollow tree occupied by a single pair of these industrious creatures; although generally the quantity of provision laid up by them is considerably less.

When, for instance, nuts are abundant in the autumn, large quantities in the green

state, covered by their thick envelope, are collected in a heap near the tree whence they have fallen; they are then covered up with leaves, until the pericarp, or thick outer covering, either falls off or opens, when the Squirrel is able to carry off the nuts more conveniently. In obtaining shell-barks, butter-nuts, (*Juglans cinerea*) chesnuts, hazel-nuts, &c., this Squirrel adopts the mode of most of the other species. It advances as near to the extremity of the branch as it can with safety, and gnaws off that portion on which the nuts are dependent. This is usually done early in the morning, and the noise occasioned by the falling of large bunches of chesnut burrs, or clusters of butter-nuts, hickory, or beech-nuts, thus detached from the parent stem, may be heard more than a hundred yards off.

This little Squirrel seems also to accommodate itself to its situation in another respect. In Pennsylvania, and the southern part of New York, where the winters are comparatively mild, it is very commonly satisfied with a hollow tree as a winter residence; but in the latitude of Saratoga, N. Y., in the northern part of Massachusetts, in New Hampshire, Maine, Canada, and farther north, it usually seeks for additional protection from the cold, by forming deep burrows in the earth. Nothing is more common than to meet with five or six Squirrel-holes in the ground, near the roots of some white pine or hemlock; and these retreats can be easily found by the vast heaps of scales from the cones of pines and firs, which are in process of time accumulated around them. This species can both swim and dive.

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GEOGRAPHICAL DISTRIBUTION.

The limits of the northern range of this species are not precisely determined, but all travellers who have braved the snows of our Polar regions, speak of its existence as far north as their journeys extended. It has been observed in the 68th or 69th parallel of latitude; it also exists in Labrador, Newfoundland and Canada. It is the most common species in New England and New York, and is by no means rare in Pennsylvania and New Jersey, especially in the hilly or mountainous portions of the latter State. It is seen, in diminished numbers, in the mountains of Virginia, although in the alluvial parts of that State, it is scarcely known; as we proceed southwardly, it becomes more rare, but still continues to be met with on the highest mountains. The most southern locality to which we have traced it, is a high peak called the Black mountain, in Buncombe county, N. Carolina. The woods growing in that elevated situation are in some places wholly composed of balsam-fir trees, (*Abies*

balsamea.) on the cones of which these Squirrels feed. There this little animal is quite common, and has received a new English name, viz., that of, "Mountain boomer." Toward the west we have traced it to the mountains of Tennessee; beyond the Rocky mountains, it does not exist.

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GENUS PTEROMYS.—ILLIGER.

The generic name *pteronmys* is derived from two Greek words, πτερον, (*pteron*.) a wing, and μυς, (*mys*.) a mouse.

There are thirteen well-determined species belonging to this genus. One is found in the north of Europe, four in North America, and the remainder in Asia and other parts of the old world.

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LEPUS SYLVATICUS.—BACHMAN.

GRAY RABBIT.

SYNONYMES.

CONY, Third Voyage of the English to Virginia, 1586, by Thomas Hariott. From Pinckerton's Voy., vol. xii., p. 600.

HARE, HEDGE CONY, Lawson, p. 122, Catesby, Appendix 28.

AMERICAN HARE, Kalm's Travels, vol. i., p. 105.

LEPUS AMERICANUS, Desmarest, Mam., p. 351.

" " Harlan, Fauna, p. 193.

" " Godman, Nat. Hist., vol. ii., p. 157.

" " Audubon, Birds of America, vol. ii., p. 51, in the talons of *Falco borealis*; Ornithological Biography, vol. i., p. 272.

LEPUS AMERICANUS, Bach., Jour. Ac. Sc. Phil., vol. vii., p. 326.

" SYLVATICUS, Bach., Jour. Ac. Sc. Phil., vol. vii., p. 403, & vol. viii., p. 78 & 326.

" AMERICANUS, Emmons, Mass. Report, 1840, p. 56.

" NANUS, Dekay, Nat. Hist. of New York, 1842.

DESCRIPTION.

This species bears some resemblance to the European burrowing rabbit, (*L. cuniculus*.) in the gray colour which is natural to the latter in a wild state, but does not change to the different colours the European rabbit presents in a state of domestication.

The Gray Rabbit possesses the habit of all the other species of this genus, with which we are acquainted, of stamping with its hind feet on

the earth when alarmed at night, and when the males are engaged in combat. It is also seen during the spring season, in wood-paths and along the edges of fields, seeking food late in the mornings and early in the afternoons, and during the breeding season even at mid-day: on such occasions, it may be approached and shot with great ease. This species, like all the true hares, has no note of recognition, and its voice is never heard, except when wounded or at the moment of its capture, when it utters a shrill, plaintive cry, like that of a young child in pain; in the Northern hare this cry is louder, shriller, and of longer continuance. The common domesticated European rabbit seems more easily made to cry out in this way than any other of the genus.

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The Gray Rabbit, although it breeds freely in enclosed warrens, seldom becomes tame, and will probably never be domesticated. When captive, it seems to be constantly engaged in trying to find some means of escape, and though it digs no burrows in a state of nature, yet, when confined, it is capable of digging to the depth of a foot or more under a wall, in order to effect its object.

The Gray Rabbit is one of the most prolific of all our species of this genus; in the Northern States it produces young about three times in the season, from five to seven at a litter, whilst in Carolina, its young are frequently brought forth as early as the twentieth of February, and as late as the middle of October, and in all the intermediate months. Nature seems thus to have made a wise provision for the preservation of the species, since no animal is more defenceless or possesses more numerous enemies. Although it can run with considerable swiftness for some distance, its strength in a short time is exhausted, and an active dog would soon overtake it if it did not take shelter in some hole in the earth, heap of logs, or stones, or in a tree with a hollow near its root; in these retreats it is often captured by young hunters.

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This species is also captured occasionally by the skunk and other carnivorous animals when in its form. Its most formidable enemy, however, is the ermine, which follows its tracks until it retires to a hole in the earth or to a hollow tree, which the little but ferocious creature, although not one-fourth as large as the timid Rabbit, quickly enters and kills it—eating off the head, and leaving the body until a want of food compels it to return for more.

We bethought ourselves of using one of each species of these weasels instead of a ferret, to aid in taking the Rabbits we wanted, and having provided ourselves with a man and a dog to hunt the Rabbits to their holes, we took the weasels in a small tin box with us, having first tied a small cord around their necks in such a manner as to prevent them from escaping, or remaining in the holes to eat the Rabbits, whilst it could not slip and choke them.

We soon raced a Rabbit to its hole, and our first experiment was made with the little brown weasel, (*P. fuscus*;) it appeared to be frightened, and refused to enter the hole; the common species, (*P. erminea*;) although we had captured the individual but a few days before, entered readily; but having its jaws at liberty, it killed the Rabbit. Relinquishing the weasel to our man, he afterwards filed its teeth down to prevent it from destroying the Rabbits; and when thus rendered harmless, the

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ermine pursued the Rabbits to the bottom of their holes, and terrified them so that they instantly fled to the entrance and were taken alive in the hand; and although they sometimes scrambled up some distance in a hollow tree, their active and persevering little foe followed them, and instantly forced them down. In this manner the man procured twelve Rabbits alive in the course of one morning, and more than fifty in about three weeks, when we requested him to desist.

On more than one occasion we have seen the tracks of this species on the snow, giving evidence, by their distance from each other, that the animal had passed rapidly, running under the influence of fear. Examining the surface of the snow carefully, we observed the foot-prints of the weasel, as if in pursuit, and following up the double trail, we found, at the mouth of a hole a short distance beyond, the mutilated remains of the luckless Rabbit.

GEOGRAPHICAL DISTRIBUTION.

We have not heard of the existence of this species farther north than the southern counties of the State of New Hampshire, beyond which it is replaced by other and larger species. It cannot be said to be abundant in the New England States, except in a few localities, and it does not seem to prefer high mountainous regions. In occasional botanical excursions among the Catskill mountains, and those of Vermont and New Hampshire, where we saw considerable numbers of the Northern hare we found scarcely any traces of the present species, especially in the mountains east of the Hudson river.

We have traced this species through all the higher portions of Florida. To the west we have seen it in all the Southern States, and it is very abundant on the upper Missouri River to nearly 1000 miles above Saint Louis.

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In this singular manner the Gray Rabbit, the most common and best known of all the species of quadrupeds in America, had never received a specific name that was not pre-occupied. In 1827, we proposed the name of *Lepus sylvaticus*, and assigned our reasons for so doing in a subsequent paper, (See Journ. Acad. Nat. Sc., vol. viii., part 1, p. 75.) In 1840, Dr. EMMONS also, (Report on Quadrupeds of Massachusetts,) de-

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scribed it under the (wrong) name of *L. Americanus*, giving as synonymous, *L. Hudsonius*, PALLAS; American hare, FORSTER, PENNANT, Arct. Zool. HEARNE's Journey, SABINE, PARRY and RICHARDSON; who each described the Northern hare, and not this species. He, however, quoted HARLAN and GODMAN correctly, with the exception of the name which they had misapplied.

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MUS RATTUS.—LINN.

BLACK RAT.

SYNONYMIES.

Mus RATTUS, Linn., 12th ed., p. 83.

" " Schreber, Säugethiere, p. 647.

" " Desmar., in Nouv. Dict., 29, p. 48.

RAT, Buffon, Hist. Nat., vol. vii., p. 278, t. 36.

RAT ORDINAIRE, Cuv., Règne Anim., p. 197.

BLACK RAT, Penn., Arc. Zool., vol. i., p. 129.

ROLLER PONTOPPE, Dan. i., p. 611.

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Mus RATTUS, Griffith's Animal Kingdom, vol. v., 578, 5.

" " Harlan, p. 148.

" " Godman, vol. ii., p. 83.

" " Richardson, p. 140.

" " Emmons, Report on Quadrupeds of Massachusetts, p. 65.

" " Dekay, Natural History of New York, vol. i., p. 80.

HABITS.

The character of this species is so notoriously bad, that were we to write a volume in its defence we would fail to remove those prejudices which are every where entertained against this thieving cosmopolite. Possessing scarcely one redeeming quality, it has by its mischievous propensities caused the world to unite in a wish for its extermination.

The Black Rat is omnivorous, nothing seeming to come amiss to its voracious jaws—flesh, fowl or fish, and grain, fruit, nuts, vegetables, &c., whether raw or cooked, being indiscriminately devoured by it. It is very fond of plants that contain much saccharine or oleaginous matter.

The favourite abodes of this species are barns or granaries, holes under out-houses or cellars, and such like places; but it does not confine itself to any particular locality. We have seen its burrows under cellars used

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for keeping the winter supply of sweet potatoes in Carolina, in dykes surrounding rice-fields sometimes more than a mile from any dwelling, and it makes a home in clefts of the rocks on parts of the Alleghany mountains, where it is very abundant.

The Black Rat, however, lives in certain parts of the country permanently in localities where there are no human habitations, keeping in crevices and fissures in the rocks, under stones, or in hollow logs.

This species is by no means so great a pest, or so destructive, as the brown or Norway rat which has in many parts of the country either driven off or exterminated it. The Black Rat, in consequence, has become quite rare, not only in America but in Europe.

Like the Norway rat this species is fond of eggs, young chickens, ducks, &c., although its exploits in the poultry house are surpassed by the audacity and voraciousness of the other.

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We have occasionally found both species existing on the same premises, and have caught them on successive nights in the same traps: but we have invariably found that where the Norway rat exists in any considerable numbers the present species does not long remain. The Norway rat is not only a gross feeder, but is bold and successful in its attacks on other animals and birds. We have known it to destroy the domesticated rabbit by dozens; we have seen it dragging a living frog from the banks of a pond, we were once witnesses to its devouring the young of its own species; and we see no reason why it should not pursue the Black

Rat to the extremity of its burrow, and there seize and devour it. Be this as it may, the latter is diminishing in number in proportion to the multiplication of the other species, and as they are equally prolific and equally cunning, we cannot account for its decrease on any other supposition than that it becomes the prey of the more powerful and more voracious Norway rat.

The Black Rat brings forth young four or five times in a year; we have seen from six to nine young in a nest, which was large and composed of leaves, hay, decayed grasses, loose cotton, and rags of various kinds, picked up in the vicinity.

GEOGRAPHICAL DISTRIBUTION.

This species is constantly carried about in ships, and is found, although very sparingly, in all our maritime cities. We have met with it occasionally in nearly all the States of the Union. On some plantations in Carolina, particularly in the upper country, it is the only species, and is very abundant. We have, however, observed that in some places where it was very common a few years ago, it has altogether disappeared, and has been succeeded by the Norway rat. The Black Rat has been transported to every part of the world where men carry on commerce by means of ships, as just mentioned.

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PTEROMYS VOLUCELLA.—GMEL.

COMMON FLYING-SQUIRREL.

SYNONYMS.

- ASSAPANICK, Smith's Virginia, p. 27, 1624.
- SCIURUS AMERICANUS VOLANS, Ray, Syn. Quad.
- FLYING SQUIRREL, Lawson's Carolina, p. 124.
- LA PALATOUCHE, Buff., X., pl. 21.
- SCIURUS VOLUCELLA, Pallas, Glres, p. 353, 359.
- " " Schreber, Säugethiere, p. 808, 23, t. 222.
- " " Gmelin, Linn., Syst. Nat., p. 155, 26,
- SCIURUS VIRGINIANUS, Gmelin, Syst. Nat.
- " " Shaw's Gen. Zool., vol. ii., p. 155, t. 150
- FLYING SQUIRREL, Catesby's Carolina, vol. ii., p. 76.
- " " Pennant's Quadrupeds, p. 418, 283.

PTEROMYS VOLUCELLA, Desm., Mamm., p. 345, 554.

- " " Harlan, p. 187.
- " " Godman, vol. ii., p. 146.
- " " Emmons, Report, p. 69.
- " " Dekay, p. 65.

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We recollect a locality not many miles from Philadelphia, where, in order to study the habits of this interesting species, we occasionally strayed into a meadow containing here and there immense oak and beech trees. One afternoon we took our seat on a log in the vicinity to watch their lively motions. It was during the calm warm weather peculiar to the beginning of autumn. During the half hour before sunset nature seemed to be in a state of silence and repose. The birds had retired to the shelter of the forest. The night-hawk had already commenced his low evening flight, and here and there the common red bat was on the wing; still for some time not a Flying-Squirrel made its appearance. Suddenly, however, one emerged from its hole and ran up to the top of a tree; another soon followed, and ere long dozens came forth, and commenced their graceful flights from some upper branch to a lower bough. At times one would be seen darting from the topmost branches of a tall oak, and with wide-extended membranes and outspread tail gliding diagonally through the air, till it reached the foot of a tree about fifty yards off, when at the moment we expected to see it strike the earth, it suddenly turned upwards and alighted on the body of the tree. It would then run to the top and once more precipitate itself from the upper branches, and sail back again to the tree it had just left. Crowds of these little creatures joined in these sportive gambols; there could not have been less than two hundred. Scores of them would leave each tree at the same moment, and cross each other, gliding like spirits through the air, seeming to have no other object in view than to indulge a playful propensity. We watched and mused till the last shadows of day had disappeared, and darkness admonished us to leave the little triflers to their nocturnal enjoyments.

During the day this species avoids the light, its large eyes like those of the owl cannot encounter the glare of the sun; hence it appears to be a dull and uninteresting pet, crawling into your sleeve or pocket, and seeking any dark place of concealment. But twilight and darkness are its season for activity and pleasure. At such times, in walking through the woods you hear a rattling among the leaves and branches, and the falling acorns, chesnuts, and beech-nuts, give evidence that this little creature is supplying itself with its food above you.

During the first winter they were confined to the room, boxes were placed in different parts of it containing Indian meal, acorns, nuts, &c. As soon as it was dark they were in the habit of hurrying from one part of the room to the other, and continued to be full of activity during the whole night. We had in the room a wheel that had formerly been attached to the cage of a Northern gray squirrel. To this they found an entrance, and they often continued during half the night turning the wheel; at times we saw the whole group in it at once. This squirrel, we may conclude, resorts to the wheel not from compulsion but for pleasure.

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The Flying-Squirrels never build their nest of leaves on the trees during summer like the true squirrels, but confine themselves to a hollow, or some natural cavity in the branches or trunk. We have very frequently found them inhabiting the eaves and roofs of houses, and we discovered a considerable number of them in the crevices of a rock in the vicinity of the Red Sulphur Springs in Virginia.

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GEOGRAPHICAL DISTRIBUTION.

This species is far more numerous than it is generally supposed to be; in traps set for the smaller rodentia in localities where we had never seen the Flying Squirrel, we frequently caught it. We have met with it in all the Atlantic States, and obtained specimens in Upper Canada, within a mile of the falls of Niagara. In Lower Canada it is replaced by a larger species, (*P. sabrinus*.) and we have reason to believe that it does not exist much to the north of the great lakes; we obtained specimens in Florida and in Texas, and have seen it in Missouri, and according to LICHTENSTEIN it is found in Mexico.

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GENUS PUTORIUS.—Cuv.

There are about fifteen well determined species of this genus, six of which belong to America, and the remainder to the Eastern continent.

The generic name *putorius* is derived from the Latin word *putor*—a fetid smell.

PUTORIUS VISON.—LINN.

MINK.

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SYNONYMIES.

- THE MINK, Smith's Virginia, 1624. Quoted from Pinkerton's Voyages, vol. xiii., p. 31.
 OTAY, Sagard Theodat, Hist. du Can., p. 749, A.D. 1636.
 FOUTEREAU, La Hontan, Voy. I., p. 81, A.D. 1703.
 MINK, Kalm's Travels, Pinkerton's Voy., vol. xiii., p. 522.
 LE VISON, Buffon, xiii., p. 308, t. 43.
 MUSTELA VISON, Linn., Gmel., i., p. 94.
 MINX, Lawson's Carolina, p. 121.
 MUSTELA LUTREOLA, Forster, Phil. Trans., lxii., p. 371.
 MINX OTTER, Pennant, Arct. Zool., i., p. 87.
 VISON WEASEL, Ibid., i., p. 78.
 JACKASH, Hearne's Journey, p. 376.
 MUSTELA VISON, Cuv., Règne Anim., vol. i., p. 150, t. 1, fig. 2.
 MUSTELA LUTREOLA, Sabine, Frank Journ., p. 652.
 MUSTELA VISON and M. LUTREOCEPHALA, Harlan, Fauna, p. 63, 65.
 MINK, Godman, Nat. Hist., vol. i., p. 206.
 PUTORIUS VISON, DeKay, Nat. Hist. New-York, p. 37, fig. 3, a. b. skull.

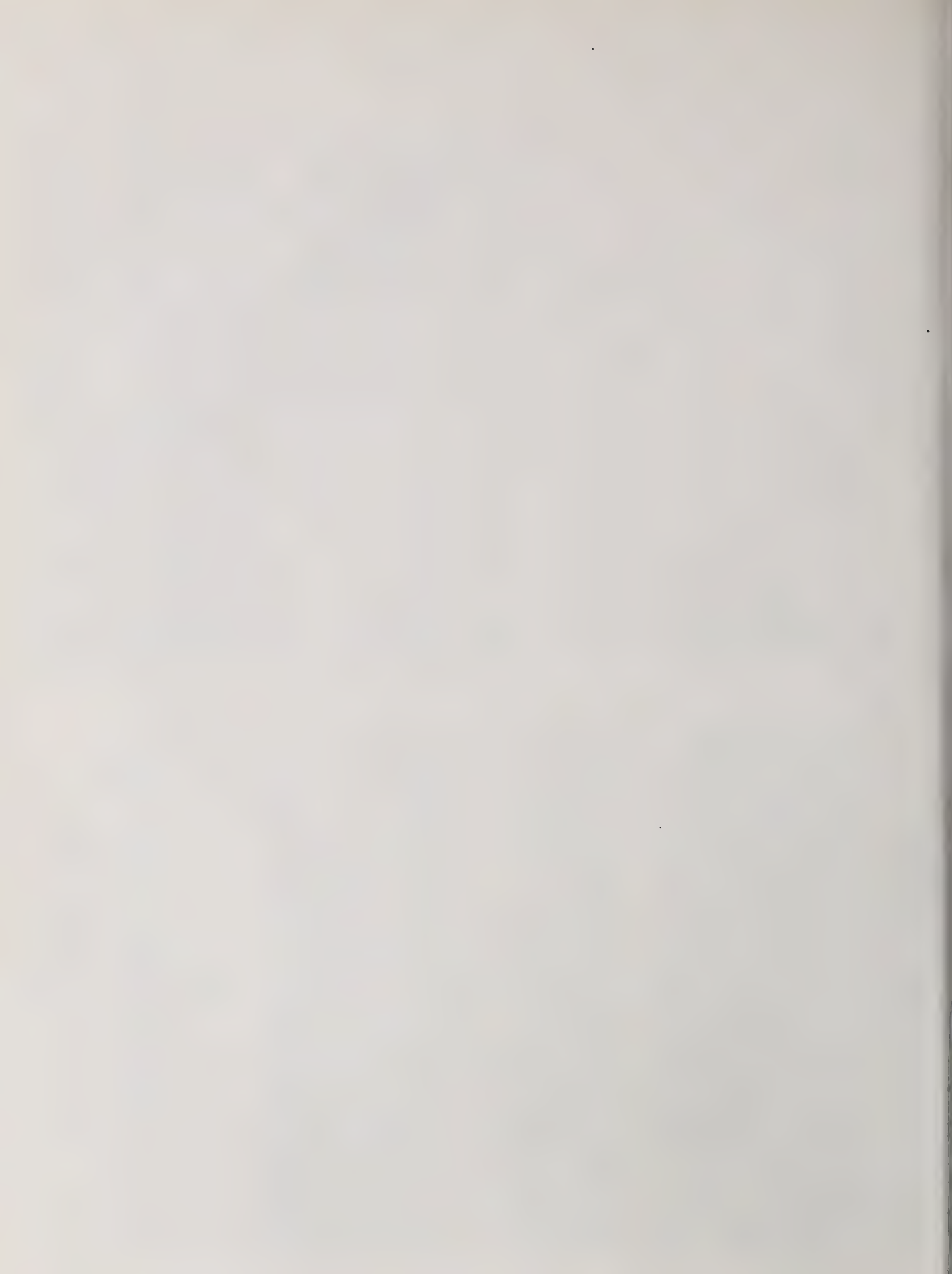
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Next to the ermine, the Mink is the most active and destructive little predator that prowls around the farm-yard, or the farmer's duck-pond; where the presence of one or two of these animals will soon be made known by the sudden disappearance of sundry young ducks and chickens. The vigilant farmer may perhaps see a fine fowl moving in a singular and most involuntary manner, in the clutches of a Mink, towards a fissure in a rock or a hole in some pile of stones, in the gray of the morning, and should he rush to the spot to ascertain the fate of the unfortunate bird, he will see it suddenly twitched into a hole too deep for him to fathom and wish he had carried with him his double-barreled gun, to have ended at once the life of the voracious destroyer of his carefully tended poultry.

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We acknowledge that we have little inclination to say anything in defence of the Mink. We must admit, however, that although he is a cunning and destructive rogue, his next door neighbour, the ermine or common weasel, goes infinitely beyond him in his mischievous propensities. Whilst the Mink is satisfied with destroying one or two fowls at a time, on which he makes a hearty meal; the weasel, in the very spirit of wanton destructiveness, sometimes in a single night puts to death every tenant of the poultry-house!

Whilst residing at Henderson, on the banks of the Ohio river, we observed that Minks were quite abundant, and often saw them carrying off rats which they caught like the weasel or ferret, and conveyed away in



their mouths, holding them by the neck in the manner of a cat.

Along the trout streams of our Eastern and Northern States, the Mink has been known to steal fish that having been caught by some angler, had been left tied together with a string while the fisherman proceeded farther in quest of more. An angler informed us that he had lost in this

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way thirty or forty fine trout, which a Mink dragged off the bank into the stream and devoured, and we have been told that by looking carefully after them, the Minks could be seen watching the fisherman and in readiness to take his fish, should he leave it at any distance behind him.

Mr. Hutson of Halifax informed us that he had a salmon weighing four pounds carried off by one of them.

We are disposed to believe, however, that fishes are not the principal food on which the Mink subsists. We have sometimes seen it feeding on frogs and cray-fish. In the Northern States we have often observed it with a Wilson's meadow-mouse in its mouth, and in Carolina the very common cotton-rat furnishes no small proportion of its food. We have frequently remarked it coursing along the edges of the marshes, and found that it was in search of this rat, which frequents such localities, and we discovered that it was not an unsuccessful mouser. We once saw a Mink issuing from a hole in the earth, dragging by the neck a large Florida rat.

This species has a good nose, and is able to pursue its prey like a hound following a deer. A friend of ours informed us that once while standing on the border of a swamp near the Ashley river, he perceived a marsh-hare dashing by him; a moment after came a Mink with its nose near the ground, following the frightened animal, apparently by the scent, through the marsh.

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This species is very numerous in the salt-marshes of the Southern States, where it subsists principally on the marsh-hen, (*Rallus crepitans*), the sea-side finch, (*Ammodramus maritimus*), and the sharp-tailed finch, (*A. caudacutus*) which, during a considerable portion of the year, feed on the minute shell-fish and aquatic insects left on the mud and oyster-banks, on the subsiding of the waters.

It is at low tide that this animal usually captures the marsh-hen. We have often at high spring tide observed a dozen of those birds standing on a small field of floating sticks and matted grasses, gazing stupidly at

a Mink seated not five feet from them. No attempt was made by the latter to capture the birds that were now within his reach. At first we supposed that he might have already been satiated with food and was disposed to leave the tempting marsh-hens till his appetite called for more; but we were after more mature reflection inclined to think that the high spring tides which occur, exposing the whole marsh to view and leaving no place of concealment, frighten the Mink as well as the marsh-hen; and as misery sometimes makes us familiar with strange associates, so the Mink and the marsh-hen like neighbour and brother hold on to their little floating islands till the waters subside, when each again follows the instincts of nature.

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It is generally supposed that the Mink never resorts to a tree to avoid pursuit; we have, however, witnessed one instance to the contrary. In hunting for the ruffed-grouse, (*T. umbellus*), we observed a little dog that accompanied us, barking at the stem of a young tree, and on looking up, perceived a Mink seated in the first fork, about twelve feet from the ground. Our friend, the late Dr. Wright, of Troy, informed us that whilst he was walking on the border of a wood, near a stream, a small animal which he supposed to be a black squirrel, rushed from a tuft of grass, and ascended a tree. After gaining a seat on a projecting branch, it peeped down at the intruder on its haunts, when he shot it, and picking it up, ascertained that it was a Mink.

We think, however, that this animal is not often seen to ascend a tree, and these are the only instances of its doing so which are known to us.

This species is a good swimmer, and like the musk-rat dives at the flash of a gun; we have observed, however, that the percussion-cap now in general use is too quick for its motions, and that this invention bids fair greatly to lessen its numbers. When shot in the water the body of the Mink, as well as that of the otter, has so little buoyancy, and its bones are so heavy, that it almost invariably sinks.

The Mink, like the musk-rat and ermine, does not possess much cunning, and is easily captured in any kind of trap; it is taken in steel-traps and box-traps, but more generally in what are called dead-falls. It is attracted by any kind of flesh, but we have usually seen the traps baited with the head of a ruffed grouse, wild duck, chicken, jay, or other

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bird. The Mink is exceedingly tenacious of life, and we have found it still alive under a dead-fall, with a pole lying across its body pressed

down by a weight of 150 lbs., beneath which it had been struggling for nearly twenty-four hours.

This species, as well as the skunk and the ermine, emits an offensive odour when provoked by men or dogs, and this habit is exercised likewise in a moderate degree whenever it is engaged in any severe struggle with an animal or bird on which it has seized.

The latter end of February or the beginning of March, in the latitude of Albany, N. Y., is the rutting season of the Mink. At this period the ground is usually still covered with snow, but the male is notwithstanding very restless, and his tracks may every where be traced, along ponds, among the slabs around saw-mills, and along nearly every stream of water.

We saw six young dug from a hole in the bank of a Carolina rice-field; on another occasion we found five enclosed in a large nest situated on a small island in the marshes of Ashley river. In the State of New York, we saw five taken from a hollow log, and we are inclined to set down that as the average number of young this species brings forth at a time.

The Mink, when taken young, becomes very gentle and forms a strong attachment to those who fondle it in a state of domestication. RICHARDSON saw one in the "possession of a Canadian woman, that passed the day in her pocket, looking out occasionally when its attention was roused by any unusual noise."

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GEOGRAPHICAL DISTRIBUTION.

The Mink is a constant resident of nearly every part of the continent of North America. RICHARDSON saw it as far north as latitude 66°, on the banks of the Mackenzie river, and supposed that it ranged to the mouth of that river in latitude 69°; it exists in Canada, and we have seen it in every State of the Union.

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KALM and LAWSON refer to it; the former stating that the English and the Swedes gave it the name of Mink, Moenk being the name applied to a closely allied species existing in Sweden.

The doubts respecting the identity of the American Mink (*P. vison*) and the *Mustela lutreola* of the north of Europe, have not as yet been satisfactorily solved.

The fact that both species exist far to the northward, and consequently approach each other toward the Arctic circle, presents an argument favourable to their identity. In their semi-palmated feet, as well

as in their general form and habits, they resemble each other.

The following reasons, however, have induced us, after some hesitation, and not without a strong desire for farther opportunities of comparison, especially of the skulls, to regard the American *P. vison* as distinct from the *lutreola* of the north of Europe.

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SCIURUS MIGRATORIUS.—AUD. AND BACH.

MIGRATORY GRAY SQUIRREL.—NORTHERN GRAY SQUIRREL.

SYNONYMES.

GRAY SQUIRREL, Pennant, Arct. Zool., vol. i., p. 185, Hist. Quad., No. 272.

SCIURUS CINEREUS, Harlan, Fauna, p. 173.

" CAROLINENSIS, Godman, non Gmel.

" LEUCOTIS, Gapper, Zool. Journ., London, vol. v., p. 206, (published about 1830.)

" " Bach., Proceedings of the Zoological Society, p. 91, London, 1838.

COMMON, or LITTLE GRAY SQUIRREL, Emmons, Report, 1842, p. 66.

SCIURUS LEUCOTIS, Dekay, Nat. Hist. N. Y., p. 57.

" VULPINUS, do. do. p. 59.

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This species appears under many varieties; there are, however, two very permanent ones, which we shall attempt to describe.

1st, Gray variety.—The nose, cheeks, a space around the eyes extending to the insertion of the neck, the upper surface of the fore and hind feet, and a stripe along the sides, yellowish-brown; the ears on their posterior surface, are in most specimens brownish-yellow; in about one ten they are dull white, edged with brown. On the back, from the shoulders there is an obscure stripe of brown, broadest at its commencement, running down to a point at the insertion of the tail. In some specimens this stripe is wanting. On the neck, sides, and hips, the colour is light gray; the hairs separately are for one half their length dark cinereous, then light umber, then a narrow mark of black, and are tipped with white; a considerable number of black hairs are interspersed, giving it a yellowish-brown colour on the dorsal aspect, and a light gray tint on the sides; the hairs in the tail are light yellowish-brown from the roots, with three stripes of black, the outer one being widest, and broadly tipped with white; the whole under surface is white. The above is the most common variety.

2d, Black variety.—This we have on several occasions seen taken

with the gray variety from the same nest. Both varieties breed and rear their young together.

This appears to be the most active and sprightly species of squirrel existing in our Atlantic States. It sallies forth with the sun, and is industriously engaged in search of food for four or five hours in the morning, scratching among leaves, running over fallen logs, ascending trees, or playfully skipping from bough to bough, often making almost incredible leaps from the higher branches of one tree to another. In the middle of the day it retires for a few hours to its nest, resuming its active labours and amusements in the afternoon, and continuing them without intermission till long after the setting of the sun. During the warm

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weather of spring and summer it prepares itself a nest on a tree, but not often at its summit. When constructing this summer-house it does not descend to the earth in search of materials, finding them ready at hand on the tree it intends to make its temporary residence. It first breaks off some dry sticks, if they can be procured; if, however, such materials are not within reach, it gnaws off green branches as large as a man's thumb, and lays them in a fork of the stem, or of some large branch.

In winter they reside altogether in holes in trees, where their young in most instances are brought forth.

Although a family, to the number of five or six, probably the offspring of a single pair the preceding season, may occupy the same nest during winter, they all pair off in spring, when each couple occupies a separate nest, in order to engage in the duties of reproduction. The young, in number from four to six, are brought forth in May or June; they increase in size rapidly, and are sufficiently grown in a few weeks to leave the nest;

Sometimes two are placed within a wheel, when they soon learn to accommodate themselves to it, and move together with great regularity. Notwithstanding the fact that they become very gentle in confinement, no instance has come to our knowledge of their having produced young while in a state of domestication, although in a suitable cage such a result would in all probability be attained.

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During the rutting season the males (like deer and some other species)

engage in frequent contests, and often bite and wound each other severely. The story of the conqueror emasculating the vanquished on these occasions, has been so often repeated, that it perhaps is somewhat presumptuous to set it down as a vulgar error. It may, however, be advanced, that the admission of such skill and refinement in inflicting revenge would be ascribing to the squirrel a higher degree of physiological and anatomical knowledge than is possessed by any other quadruped. From the observations we have been enabled to make, we are led to believe that the error originated from the fact that those parts in the male, which in the rutting season are greatly enlarged, are at other periods of the year diminished to a very small size; and that, in young males especially, they are drawn into the pelvis by the contraction of the muscles.

It is generally believed that this species lays up a great hoard of food as a winter supply; it may however be reasonably doubted whether it is very provident in this respect. The hollow trees in which these Squirrels shelter themselves in winter are frequently cut down, and but a very small supply of provisions has ever been found in their nests. On following their tracks in the snow, they cannot be traced to any hoards buried in the ground. We have sometimes observed them during a warm day in winter coming from great distances into the open fields, in search of a few dry hickory nuts which were still left suspended on the trees. If provisions had been laid up nearer home, they would hardly have undertaken these long journeys, or exposed themselves to so much danger in seeking a precarious supply. In fact, this species, in cold climates, seldom leaves its nest in winter, except on a warm sunny day, and in a state of inactivity and partial torpidity, it requires but little food.

Although this Squirrel is at particular seasons of the year known to search for the larvæ of different insects, which it greedily devours, it feeds principally on nuts, seeds, and grain, which are periodically sought for

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by all the species of this genus; among these it seems to prefer the shell-bark, (*Carya alba*), and several species of hickory nuts, to any other kind of food. Even when the nuts are so green as to afford scarcely any nourishment, it may be seen gnawing off the thick pericarp or outer shell which drops in small particles to the ground like rain, and then with its lower incisors it makes a small linear opening in the thinnest part of the shell immediately over the kernel. When this part has been extracted, it proceeds to another, till in an incredibly short space of time, the nut

is cut longitudinally on its four sides, and the whole kernel picked out, leaving the dividing portions of the hard shell untouched.

At the season of the year when it feeds on unripe nuts, its paws and legs are tinged by the juices of the shells, which stain them an ochrey-red colour, that wears off, however, towards spring.

Were this species to confine its depredations to the fruit of the hickory, chesnut, beech, oak and maple, it would be less obnoxious to the farmer; but unfortunately for the peace of both, it is fond of the green Indian-corn and young wheat, to which the rightful owner imagines himself to have a prior claim.

In addition to the usual enemies of this species in the Northern States, such as the weasel, fox, lynx, &c., the red-tailed hawk seems to regard it as his natural and lawful prey. It is amusing to see the skill and dexterity exercised by the hawk in the attack, and by the squirrel in attempting to escape. When the hawk is unaccompanied by his mate, he finds it no easy matter to secure the little animal; unless the latter be pounced upon whilst upon the ground, he is enabled by dodging and twisting round a branch to evade the attacks of the hawk for an hour or more, and frequently worries him into a reluctant retreat.

But the red-tails learn by experience that they are most certain of this

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prey when hunting in couples. The male is frequently accompanied by his mate, especially in the breeding season, and in this case the Squirrel is soon captured. The hawks course rapidly in opposite directions, above and below the branch; the attention of the Squirrel is thus divided and distracted, and before he is aware of it the talons of one of the hawks are in his back, and with a shriek of triumph the rapacious birds bear him off, either to the aerie in which their young are deposited, to some low branch of a tree, or to a sheltered situation on the ground, where with a suspicious glance towards each other, occasionally hissing and grumbling for the choice parts, the hawks devour their prey.

This species of squirrel has occasionally excited the wonder of the populace by its wandering habits and its singular and long migrations. Like the lemming (*Lemmus Norvegicus*) of the Eastern continent, it is stimulated either by a scarcity of food, or by some other inexplicable instinct, to leave its native haunts, and seek for adventures or for food in some (to it) unexplored portion of our land.

The newspapers from the West contain many interesting details of these migrations; they appear to have been more frequent in former

years than at the present time. The farmers in the Western wilds regard them with sensations which may be compared to the anxious apprehensions of the Eastern nations at the flight of the devouring locust. At such periods, which usually occur in autumn, the Squirrels congregate in different districts of the far North-west; and in irregular troops bend their way instinctively in an eastern direction. Mountains, cleared fields, the narrow bays of some of our lakes, or our broad rivers, present no unconquerable impediments. Onward they come, devouring on their way every thing that is suited to their taste, laying waste the corn and wheat-fields of the farmer; and as their numbers are thinned by the gun, the dog, and the club, others fall in and fill up the ranks, till they occasion infinite mischief, and call forth more than empty threats of vengeance. It is often inquired, how these little creatures, that on common occasions have such an instinctive dread of water, are enabled to cross broad and rapid rivers, like the Ohio and Hudson for instance. It has been asserted by authors, and is believed by many, that they carry to the shore a suitable piece of bark, and seizing the opportunity of a favourable breeze, seat themselves upon this substitute for a boat, hoist their broad tails as a sail, and float safely to the opposite shore. This, together with many other traits of intelligence ascribed to this species, we suspect to be apocryphal. That they do migrate at irregular, and occasionally at distant periods, is a fact sufficiently established; but in the only two instances in which we had opportunities of witnessing the mi-

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grations of these Squirrels, it appeared to us, that they were not only unskilful sailors but clumsy swimmers. One of these occasions, (as far as our recollection serves us) was in the autumn of 1808 or 1809; troops of Squirrels suddenly and unexpectedly made their appearance in the neighbourhood; among them were varieties not previously seen in those parts; some were broadly striped with yellow on the sides, and a few had a black stripe on each side, bordered with yellow or brown, resembling the stripes on the sides of the Hudson's Bay squirrel, (*S. Hudsonius*.) They swam the Hudson in various places between Waterford and Saratoga; those which we observed crossing the river were swimming deep and awkwardly, their bodies and tails wholly submerged; several that had been drowned were carried downwards by the stream, and those which were so fortunate as to reach the opposite bank were so wet and fatigued, that the boys stationed there with clubs found no difficulty in securing them alive or in killing them.

This species exists as far to the north as Hudson's Bay. It was formerly very common in the New England States, and in their least cultivated districts is still frequently met with. It is abundant in New York and in the mountainous portions of Pennsylvania. We have observed it on the northern mountains of Virginia, and we obtained several specimens on the Upper Missouri. The black variety is more abundant in Upper Canada, in the western part of New York, and in the States of Ohio and Indiana, than elsewhere. The Northern Gray Squirrel does not exist in any of its varieties in South Carolina, Georgia, Florida, or Alabama; and among specimens sent to us from Louisiana, stated to include all the squirrels existing in that State, we did not discover this species.

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MUS LEUCOPUS.—RAFINESQUE.

AMERICAN WHITE-FOOTED MOUSE.

SYNONYMES.

- MUS SYLVATICUS, Forster, Phil. Trans., vol. lxii., p. 380.
 FIELD-RAT, Penn., Hist. Quad., vol. ii., p. 185.
 " Arctic Zool., vol. i., p. 131.
 MUSCULUS LEUCOPUS, Rafinesque, Amer. Month. Review, Oct. 1818, p. 444.
 MUS LEUCOPUS, Desmar. Mamm., esp. 493.
 MUS SYLVATICUS, Harlan, Fauna, p. 151.
 MUS AGRARIUS, Godm., Nat. Hist., vol. ii., p. 88.
 MUS LEUCOPUS, Richardson, F. B. A., p. 142.
 ARVICOLA NOTTALLII, Harlan, variety.
 ARVICOLA EMMONSII, Emm., Mass. Report, p. 61.
 MUS LEUCOPUS, Dekay, Nat. Hist. N. Y., pt. 1, p. 82.

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GENUS MEPHITIS.—Cuv.

In the recent work of Dr. LICHTENSTEIN, (Ueber die Gattung Mephitis, Berlin, 1838,) seventeen species of this genus are enumerated, one of which is found at the Cape of Good Hope, two in the United States of America, and the remainder in Mexico and South America.

The generic name *Mephitis*, is derived from the latin word *Mephitis*, a strong odour,

MEPHITIS CHINGA.—TIEDMANN.

COMMON AMERICAN SKUNK.

SYNONYMES.

- OUNESQUE, Sagard Theodat, Canada, p. 748.
 ENFANT DU DIABLE, Charlevoix, Nouv. France, iii., p. 133.
 SKUNK-WEASEL, Pennant's Arctic Zool., vol. i., p. 85.
 SKUNK, Hearne's Journey, p. 377.
 MEPHITIS CHINGA, Tiedmann, Zool. i., p. 361, (Anh. 37.) 1808.
 POLE-CAT SKUNK, Kalm's Travels, vol. ii., p. 378.
 VIVERRA MEPHITIS, Gmel. (L.) Syst. Nat., p. 88.
 MUSTELA AMERICANA, Desm. Mamm., p. 186, A. D. 1820.
 MEPHITIS AMERICANA, Sab., Frank. Journal, p. 653.
 " " Harlan, Fauna, p. 70.
 THE SKUNK, Godm., Nat. Hist., vol. i., p. 213.
 MEPHITIS AMERICANA, Var. HUDSONICA, Rich., F. B. A., p. 55.
 " CHINGA, Lichtenstein, Darstellung neuer oder wenig bekannter Säugethiere, Berlin, 1827-34, xlv. Tafel, 1st figure.
 " CHINQUE, Licht., Ueber die Gattung Mephitis, p. 32, Berlin, 1838.
 " AMERICANA, Dekay, Nat. Hist. N. Y., pt. 1, p. 29.

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COLOUR.

This species varies so much in colour that there is some difficulty in finding two specimens alike; we have given a representation on our plate of the colour which is most common in the Middle States, and which Dr. HARLAN described as *Mephitis Americana*, our specimen only differing from his in having a longitudinal stripe on the forehead.

There is a narrow white stripe commencing on the nose and running to a point on the top of the head; a patch of white, of about two inches in length, and of the same breadth, commences on the occiput and covers the upper parts of the neck; on each side of the vertebræ of the tail there is a broad longitudinal stripe for three fourths of its length; the tail is finally broadly tipped with white, interspersed with a few black hairs. The colour on every other part of the body is blackish-brown.

Another specimen from the same locality has a white stripe on the forehead; a large white spot on the occiput, extending downwards, diverging on the back, and continuing down the sides to within two inches of the extremity of the tail, leaving the back, the end of the tail, and the whole of the under surface blackish-brown.

The young on the plate are from the same nest; one has white stripes on the back, with a black tail; the other has no stripes on the back, but

The young differed very widely in colour; we could not find two exactly alike; some were in part, of the colour of the male, others were more like the female, whilst the largest proportion were intermediate in their markings, and some seemed to resemble neither parent. We recollect one that had not a white hair, except the tip of the tail and a minute dorsal line.

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HABITS.

There is no quadruped on the continent of North America the approach of which is more generally detested than that of the Skunk: from which we may learn that, although from the great and the strong we have to apprehend danger, the feeble and apparently insignificant may have it in their power to annoy us almost beyond endurance.

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That there is something very acrid in the fluid ejected by the Skunk, cannot be doubted, when we consider its effects. Dr. RICHARDSON states that he knew several Indians who lost their eyesight in consequence of inflammation produced by its having been thrown into them by the animal.

This offensive fluid is contained in two small sacs situated on each side of the root of the tail, and is ejected through small ducts near the anus. We have on several occasions witnessed the manner in which this secretion is discharged. When the Skunk is irritated, or finds it necessary to defend himself, he elevates his tail over his back, and by a strong muscular exertion ejects it in two thread-like streams in the direction in which the enemy is observed. He appears to take an almost unerring aim, and almost invariably salutes a dog in his face and eyes. Dr. RICHARDSON states that he ejects this noisome fluid for upwards of four feet; in this he has considerably underrated the powers of this natural syringe of the Skunk, as we measured the distance on one occasion, when it extended upwards of fourteen feet. The notion of the old authors that this fluid is the secretion of the kidneys, thrown to a distance by the aid of his long tail, must be set down among the vulgar errors, for in that case whole neighbourhoods would be compelled to breathe a tainted gale, as Skunks are quite common in many parts of the country.

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Should the Skunk make a discharge from this all-conquering battery during the day, the fluid is so thin and transparent that it is scarcely perceptible, but at night it has a yellowish luminous appearance; we

have noticed it on several occasions, and can find no more apt comparison than an attenuated stream of phosphoric light.

The properties of the peculiarly offensive liquor contained in the sacs of the Skunk, have not, so far as we are advised, been fully ascertained. It has, however, been sometimes applied to medical purposes. Professor IVES, of New Haven, administered to an asthmatic patient a drop of this fluid three times a day. The invalid was greatly benefitted: all his secretions, however, were soon affected to such a degree, that he became highly offensive both to himself and to those near him. He then discontinued the medicine, but after having been apparently well for some time the disease returned. He again called on the doctor for advice,--the old and tried recipe was once more recommended, but the patient declined taking it, declaring that the remedy was worse than the disease!

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The Skunk is so slow in his actions, that it is difficult to discover in what manner he obtains food to enable him always to appear in good condition. In the northern part of New York the gray rabbit frequently retires to the burrow of the fox, Maryland marmot, or Skunk. Many of them remain in these retreats during the day. We have seen the tracks of the Skunk in the snow, on the trail of the gray rabbit, leading to these holes, and have observed tufts of hair and patches of skin scattered in the vicinity, betokening that the timid animal had been destroyed.

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Whilst riding along the border of a field one evening, we observed a large bird of some species darting to the ground, and immediately heard a struggle, and were saluted by the odour from the "Enfant du diable," as old CHARLEVOIX has designated the Skunk. We visited the spot on the following day, and found a very large animal of this species partly devoured. We placed a fox-trap in the vicinity, and on the following morning found our trap had captured a large horned owl, which had evidently caused the death of the Skunk, as in point of offensive effluvia there was no choice between them; this species is generally very easily taken in traps.

The burrows of the Skunk are far less difficult to dig out than those of the fox. They are generally found on a flat surface, whilst the dens of the fox are more frequently dug on the side of a hill. They have seldom more than one entrance, whilst those of the fox have two, and often three. The gallery of the burrow dug by the Skunk runs

much nearer the surface than that excavated by the fox. After extending seven or eight feet in a straight line, about two feet beneath the surface, there is a large excavation containing an immense nest of leaves. Here during winter may be found lying, from five to fifteen individuals of this species. There are sometimes one or two galleries diverging from this bed, running five or six feet further; in which, if the burrow has been disturbed, the whole family may generally be found, ready to employ the only means of defence with which Nature has provided them.

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This animal generally retires to his burrow about December, in the Northern States, and his tracks are not again visible until near the tenth of February. He lays up no winter store; and like the bear, raccoon, and Maryland marmot, is very fat on retiring to his winter quarters, and does not seem to be much reduced in flesh at his first appearance toward spring, but is observed to fall off soon afterwards. He is not a sound sleeper on these occasions; on opening his burrow we found him, although dull and inactive, certainly not asleep, as his black eyes were peering at us from the hole, into which we had made an opening, seeming to warn us not to place too much reliance on the hope of finding this striped "weasel asleep."

We have seen the young early in May; there were from five to nine in a litter.

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It is exceedingly abundant in every part of the Northern States. In New England, New York, and Pennsylvania, it is more frequently met with than in Maryland, Virginia, and the more Southern States. It is not uncommon on both sides of the Virginia Mountains, and is well known in Kentucky, Indiana, and Illinois. It is not unfrequently met with in the higher portions of South Carolina, Georgia, and Alabama. In the alluvial lands of these three States, however, it is exceedingly rare.

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GENUS ARVICOLA.—LACÉPÈDE.

They burrow in the earth, and feed on grain, bulbous roots and grasses; some are omnivorous, they do not climb, are not dormant in winter, but seek their food during cold weather, eating roots, grasses, and the bark of trees.

There have been about forty species of *Arvicola* described; some of these, however, are now arranged under other genera. Some of the species are found in each quarter of the world, about seven species

inhabit North America.

The generic name is derived from two Latin words, *arvus*, a field, and *colo*, I inhabit.

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ARVICOLA PENNSYLVANICA.—ORD.

WILSON'S MEADOW-MOUSE.

SYNONYMES.

SHORT-TAILED MOUSE, Forster, Phil. Trans., vol. lxii., p. 380. No. 18.

MEADOW MOUSE, Pennant's Arctic Zoology, vol. i., p. 133.

THE CAMPAIGNOL OF MEADOW MOUSE OF PENNSYLVANIA, Warden's Description of the U. S., vol. v., p. 625.

ARVICOLA PENNSYLVANICUS, Ord, Guthrie's Geography.

" " " in Wilson's Ornithology, vol. vi., pl. 50, fig. 3.

" PENNSYLVANICA, Harlan, F. A., p. 144.

ARVICOLA ALBO-RUFESCENS, Emmons, Mass. Reports, p. 60, variety.

ARVICOLA HIRSUTUS, Emmons, Mass. Report.

" " Dekay, Nat. Hist. N. Y., p. 86.

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HABITS.

We have had opportunities in New-York, Pennsylvania, and the New England States, of learning some of the habits of this species. It is, in fact, the common Meadow-Mouse of the Northern and Eastern States.

Wherever there is a meadow in any of these States, you may find small tortuous paths cut through the grass, appearing as if they had been partially dug into the earth, leading to the roots of a stump, or the borders of some bank or ditch. These are the work of this little animal. Should you dig around the roots, or upturn the stump, you may find a family of from five to ten of this species, and will see them scampering

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off in all directions, and although they do not run fast, they have so many hiding places, that unless you are prompt in your attack, they are likely to escape you. Their galleries do not run under-ground like those of the shrew-mole, or the mischievous pine-mouse (of Leconte,) but extend along the surface sometimes for fifty yards.

The food of this species consists principally of roots and grasses. During summer it obtains an abundant supply of herds-grass, (*Phleum pratense*) red-top, (*Agrostis vulgaris*) and other plants found in the meadows; and when the fields are covered with snow, it still pursues its summer paths, and is able to feed on the roots of these grasses, of which

a cage they are somewhat familiar, feed on grass and seeds of different kinds, and often come to the bars of the cage to receive their food.

They frequently sit erect in the manner of marmots or squirrels, and while in this position clean their faces with their paws, continuing thus engaged for a quarter of an hour at a time. They drank a good deal

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of water, and were nocturnal in their habits. During the day-time they constantly nestled under some loose cotton, where they lay, unless disturbed, until dusk, when they ran about their place of confinement with great liveliness and activity, clinging to the wires and running up and down in various directions upon them, as if intent on making their escape.

GEOGRAPHICAL DISTRIBUTION.

We have found this species in all the New England States, where it is very common. It is abundant in all the meadows of the State of New York. It is the most common species in the neighbourhood of Philadelphia. We have found it in Maryland and Delaware. It exists in the valleys of the Virginia Mountains; and we obtained a number of specimens from our friend, EDMUND RUFFIN, Esq., who procured them on the Pamunkey River, in Hanover county, in that State, where it is quite abundant. We have traced it as far south as the northern boundary of North Carolina; and to the north have met with it in Upper and Lower Canada. FORSTER obtained it from Hudson's Bay, and RICHARDSON speaks of it as very abundant from Canada to Great Bear Lake, latitude 65°.

To the west it exists along the banks of the Ohio, but we were unable to find it in any part of the region lying between the Mississippi and the Rocky Mountains.

GENERAL REMARKS.

We are fully aware of the difficulty of finding characters by which the various species of this genus may be distinguished. We cannot speak positively of WILSON'S diminutive figure of the Meadow-Mouse, (American Ornithology, vol. vi., plate 50, fig. 3; description given, p. 59, in the article on the barn-owl,) but the accurate description of it by ORB, which is creditable to him as a naturalist, cannot possibly apply to any other species than this. It is the most common arvicola near Philadelphia, and no part of the description will apply to either of the only two other species of this genus existing in that vicinity.

there is always a supply so abundant that it is generally in good condition. It is also fond of bulbs, and feeds on the meadow-garlic, (*Allium Canadense*.) and red lily, (*Lilium Philadelphicum*.)

We doubt whether this active little arvicola ever does much injury to the meadows, and in the wheat-fields it is not often a depredator, as it is seldom seen on high ground. Still, we have to relate some of its habits that are not calculated to win the affections of the farmer. In very severe winters, when the ground is frozen, and there is no covering of snow to protect the roots of its favourite grasses, it resorts for a subsistence to the stems of various shrubs and fruit trees, from which it peels off the bark, and thus destroys them. We possessed a small but choice nursery of fruit trees, which we had grafted ourselves, that was completely destroyed during a severe winter by this Meadow-Mouse, the bark having been gnawed from the wood for several inches from the ground upwards.

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The nests of this arvicola are always near the surface; sometimes two or three are found under the same stump. We have frequently during summer, observed them on the surface in the meadows, where they were concealed by the over-shadowing grasses. They are composed of about a double handful of leaves of soft grasses, and are of an oval shape, with an entrance on the side.

WILSON'S Meadow-Mouse, swims and dives well. During a freshet which covered some neighbouring meadows, we observed several of them on floating bunches of grass, sticks, and marsh weeds, sitting in an upright posture as if enjoying the sunshine, and we saw them leaving these temporary resting places and swimming to the neighbouring high grounds with great facility; a stick thrown at them on such occasions will cause them to dive like a musk-rat.

This species does not, in any part of the United States, visit dwellings or outhouses, although RICHARDSON states that it possesses this habit in Canada. We have scarcely ever met with it on high grounds, and it seems to avoid thick woods.

It produces young three or four times during the summer, from two to five at a birth. As is the case with the Florida rat and the white-footed mouse, the young of this species adhere to the teats, and are in this way occasionally dragged along by the mother.

This species is easily caught in wire-traps baited with a piece of apple, or even meat; we have occasionally found two in a trap at the same time. When they have become accustomed to the confinement of

CATALOGUE

OF

NORTH AMERICAN MAMMALS,

CHIEFLY IN THE MUSEUM OF THE

SMITHSONIAN INSTITUTION.

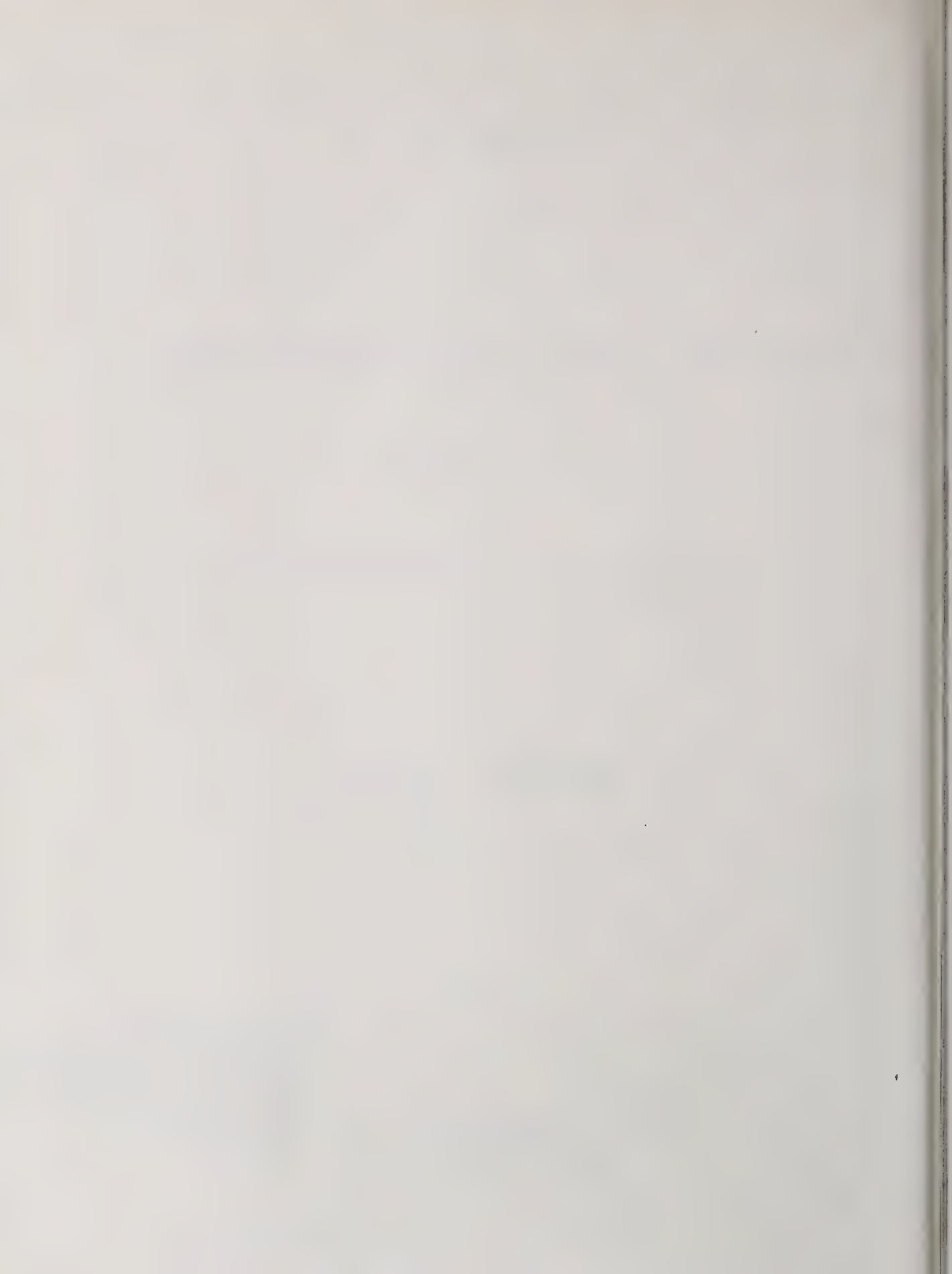
BY

SPENCER F. BAIRD,

ASSISTANT SECRETARY OF THE SMITHSONIAN INSTITUTION.

WASHINGTON:
SMITHSONIAN INSTITUTION.
JULY, 1857.

[See also:
U. S. War Department:
Reports of Explorations
and Surveys...for a Rail-
road from the Mississippi
to the Pacific Ocean
(1853-1856)
Vol. VIII, Washington
1857.]



OBSERVATIONS ON THE

*Inhabitants, Climate, Soil, Rivers, Productions,
Animals, and other matters worthy of Notice.*

MADE BY

Mr. JOHN BARTRAM,

In his Travels from

PENNSYLVANIA

TO

ONONDAGO, OSWEGO and the Lake ONTARIO,

In CANADA.

To which is annex'd, a curious Account of the

CATARACTS at NIAGARA.

By Mr. PETER KALM,

A Swedish GENTLEMAN who travelled there.



L O N D O N :

Printed for J. WHISTON and B. WHITE, in
Piccadilly-Street, 1751.

(Price One Shilling and Six-pence.)

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we punished his rage by striking him dead on the spot: he had been highly irritated by an *Indian* dog that barked eagerly at him, but was cunning enough to keep out of his reach, or nimble enough to avoid the snake when he sprung at him. We took notice that while provoked, he contracted the muscles of his scales so as to appear very bright and shining, but after the mortal stroke, his splendor became much diminished, this is likewise the case of many of our snakes.

The north side of the Hill is not so stony as the south, but yet very poor. Thence we traveled 7 miles over several hollows, swamps and small ridges, full of scrubby bushes, and still poor and stoney to the last great ridge, which is composed chiefly of large gravel, as big as pigeons or pullets eggs, and even the rocks seemed but heaps of the same materials; the descent on the north side is very steep and rocky, large craggy rocks are disposed on all sides, most part of the way down, which brought us to a fine vale, where we lodged by a creek called *Sauvel*, and were grievously stung all night with small gnats, so that I slept very little.

The 7th, we set out west from *Sauvel* creek and traveled down the vale, which is pretty good land: and leaving the creek, soon crossed another running along the north side of the vale, by the bank of which we rode through a grove

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of white Pine, very lofty and so close, that the Sun could hardly shine through; at the end of this the two branches joined. Riding a little farther, we passed through a gap of a moderate hill, north by the creek side; where we found a fishing place, mostly a deep hole near a rock; there we went west on the north side of the creek, and dined at what is called the *Double Eagle*. The land hereabouts is middling white oak and huckleberry land, and by the creek side pretty good wild grass, and the 3d branch enters about 30 rood below; having crossed this, we went up a vale of middling soil, covered with high oak Timber, nearly west to the top of the hill, (most of the way being a white clay under a shallow surface), where we first observed the impression of shells in some of the loose stones, and from whence we had a fair prospect of the river *Susquehanna*.

The descent from hence soon brought us to *Mobony*, our lodging for this night. Here the soil is very good throughout the neck, formed by the river and the creek, which is about 3 poles wide. It rained this night through our old, tho' newly erected lodging, which was an *Indian Cabin* that we took the liberty to remove, knowing they usually leave behind them a good stock of fleas on the ground they inhabit; however, the wet deprived me of my

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were in a canoe, and our horses at *Shamokin*, for we dreaded the dismal wilderness between. We observed here an old log, which the bears had cunningly turned to pick up the snails, beetles, and grubbs, that had crept under it for shelter.

7th, We rode over middling land, producing oak, pine, and great magnolia, to the *Tobicon* town on the *Cayugo* branch; this place we arrived at by noon but stayed there all night, frightened by several showers that passed over the mountains in sight: indeed it rained a little here, I walked to the branch after dinner, and found abundance of fossils on the banks, but the distance of the way, and heavy load of our baggage, were an insurmountable bar to my bringing any home. This day the *Anticoque* interpreter that travelled with us from *Onondago*, who left the path a little to hunt, missed our track and hit upon an *Indian* town, 3 miles up the branch, and there picking up a *Squaw* brought her with him. The chief man of the town came to visit us in a very friendly manner, and our interpreter telling him where we had been, what about, and how well we had succeeded; he testified abundance of satisfaction that peace was not like to be interrupted, he added, when he came home his people told him, we had passed through their town, but that we had not informed them of our business.

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This furnishes us with an instance of the *Punitilio* the *Indians* constantly treat travellers with, the people though earnestly desiring to know our commission, would not take the liberty to ask us. This night our fellow traveller lodged with his occasional wife in a corner of our cabin, and in the morning would have taken her with him at our expense, to the great vexation of Mr *Weissar*, who thought it intolerable that an intruder should gratify his private inclinations to the shortening of our necessary provisions, already insufficient; as we did not take much pains to conceal this resentment, he had determined to part with her, though with much regret, and accordingly left her when we crossed the branch, giving her a farewell shout; we heard this with much joy, and I believe it was as well for the parties.

8th, We continued our journey without meeting any thing worth remarking, the ground we had passed rode over in our way out, and had lodged at the very creek we spent this night at.

9th. We travelled to a fine creek big enough to drive two mills, we stopped for this night at the foot of a great hill, clothed with large *Magnolia*, 2 feet diameter and 100 feet high; perfectly straight, shagbark-hickory, chestnut and chestnut oak. This is like a bridge between the N.E. and N.W. branches of *Susquehanna*: here is also a spring from whence the water runs to both branches.

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10th August, We set out, the sun half an hour high, travelled along a rich hill side, where we observed a pretty many rocks, then down to a *Licking-place* by 8, where our intruder who was a good way before us shot at an Elk, and having wounded him, pursued him several hours. We waited his return till 2 o'clock, *Lewis Evans* took an observation here, and found the lat. 41. a half. Set out again at 3, and travelled over fine rich ground by a creek where we lodged. I took a fancy to ascend 2 thirds of the height of a neighbouring hill, in the way I came to abundance of loose stones, and very craggy rocks, which seemed to threaten impending ruin; the soil was black and very rich, full of great wild stinging nettles, as far as I went I rolled down several loose stones to make a path for my more expeditious return. This I found the *Indians* much disturbed at, for they said it would infallibly produce rain the next day, I told them I had sufficient experience, it signified nothing, for it was my common practice to roll down stones from the top of every steep hill, and could not recollect that it ever rained the next day, and that I was almost sure to morrow would be a very fair day.

11th, We got out before sun rise, and rode over very good bottoms of *Linden*, *Poplar* and *Elm*, we killed a rattle snake, and soon after found a patch of *Chamerodendron*, at 8 we came to a creek winding from between the

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mountains on the left, then along a level to another from the right, which we crossed to our former cabin. Quickly after we reached a bad hill, where I first found the *Ginseng* in this journey, the soil was black and light, with flat stones facing the east, there we passed by 9, then over a bottom of laurel and pine to a creek we had several times crossed, when obstructed as frequently we were by hills, keeping close to the water on the side we were riding. At 10 we left this creek for the sake of a shorter way than we came, for this purpose we kept a S. course to the top of a high but very poor hill, which we reached about a q.

after eleven, and had a prospect still to a gap we were to pass to the river; the northside of this hill was clothed with tall spruce, while pine and beech, the top with chestnut, scrubby oak, and huckle berries, the S. side with shrub, honeysuckles &c. Our way was now over a poor pebble stoney vale of laurel, spruce fir, pine, chestnut, and huckle berries, to a *Run* of water; where we dined on parched meal mixed with water. We left that place at half an hour after one, and soon found ourselves much distressed by the broad flat stones on the side of the hill, our way lay over. Our horses could hardly stand, but even slept on their sides on our left a rivulet rushed from a precipice, and the mountains were so steep and close to its sides, that we were obliged to climb to the

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top of that on the west; here we suffered our horses to rest while we gathered huckle berries to eat, we travelled on the top a good way all stony to the point, which was very narrow, and the flat stones on each side turned up like the ridge of a house, this reminded me of *Dr. Burnets Theory*, and his ingenious *Hypothesis*, to account for the formation of mountains. The descent was moderate, the land middling, oak, chestnut and huckle-berries: we found a *Run* here and reposed ourselves for this night, having supped on venison, shot by our *Indians* who left us on the hill that evening. It was fair and pleasant, and the great green grass-hopper began to sing (*Catedidist*) these were the first I observed this year. Before day break it began to rain, it lasted about an hour and then ceased. The *Indians* insisted that was caused by the stones I rolled down 2 days ago, I told the *Antecoque Indians* if their observations had any truth it should have been the day before, which was remarkably fair. To this he cunningly replied, that our *Almanacks* often prognosticated on a day, and yet the rain did not come within two days.

12th, This day, the land produced middling oak, pitch, pine, and huckleberries, sometimes pebbles and a shallow soil. We dined on venison (partly our own, and partly given us by the *Indians*) at a deserted town about 7 miles off: this is called the *French* town, from a *French*

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woman who married a *Delaware Indian*, and conformed to their manners; she left several children behind her, who were now come to look after their horses and break the young ones. It rained very fast for an hour, and in the midst of it about half a score of the

5 Nations, who had been on the back of S. Carolina to fight the *Catawba's*, passed very fast through the town with one poor female prisoner, they shouted courageously, but we learnt no particulars of this great enterprize: about 3 it cleared up, we crossed the creek and travelled about 10 miles, most of the way good rich land, extensive bottoms and high grass: I saw one lovely white *Lychnus* 5 feet high. Near night it began to rain, and we made a bark cabin, which kept us pretty dry, the rain continued all night with thunder.

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When all this water comes to the very Fall, there it throws itself down perpendicular! It is beyond all belief the surprize when you see this! I cannot with words express how amazing it is! You cannot see it without being quite terrified; to behold so vast a quantity of water falling headlong from a surprising height! I doubt not but you have a desire to learn the exact height of this great Fall. Father *Hennepin*, supposes it 600 Feet perpendicular; but he has gained little credit in *Canada*; the name of honour they give him there, is *un grand Menteur*, or *The great Liar*; he writes of what he saw in places where he never was. 'tis true he saw this Fall: but as it is the way of some travellers to magnify every thing, so has he done with regard to the fall of *Niagara*. This humour of travellers, has occasioned me many disappointments in my travels, having seldom been so happy as to find the wonderful things that had been related by others. For my part, who am not fond of the *Marvellous*, I like to see things just as they are, and so to relate them. Since Father *Hennepin's* time, this Fall by all the accounts that have been given of it, has grown less and less; and those who have measur'd it with mathematical instruments find the perpendicular fall of the water to be exactly 137 feet. *Monsr. Morandrier*, the king's engineer in

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Canada, assured me, and gave it me also under his hand, that 137 Feet was precisely the height of it; and all the *French* Gentlemen that were present with me at the Fall, did agree with him, without the least contradiction: it is true, those who have try'd to measure it with a line, find it sometimes 140, sometimes 150 feet, and sometimes more; but the reason is, it cannot that way be measured with any certainty, the water carrying away the Line. When the water is come down to

the bottom of the rock of the Fall, it jumps back to a very great height in the air; in other places it is white as milk or snow; and all in motion like a boiling chaldron.—You may remember, to what a great distance *Hennepin* says the noise of this great Fall may be heard.

All the gentlemen who were with me, agreed, that the farthest one can hear it, is 15 leagues, and that very seldom. When the air is quite calm, you can hear it to *Niagara* Fort; but seldom at other times, because when the wind blows, the waves of Lake *Ontario* make too much noise there against the Shore.—They inform'd me, that when they hear at the Fort the noise of the Fall, louder than ordinary, they are sure a North East Wind will follow, which never fails: this seems wonderful, as the Fall is South West from the Fort: and one would imagine it to be rather a sign of a contrary wind. Some-

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times, 'tis said, the Fall makes a much greater noise than at other times; and this is look'd upon as a certain mark of approaching bad weather, or rain; the *Indians* here hold it always for a sure sign.

When I was there, it did not make an extraordinary great noise: just by the Fall, we could easily hear what each other said, without speaking much louder than common when conversing in other places. I do not know how others have found so great a noise here, perhaps it was at certain times, as abovementioned. From the Place where the water falls, there rise abundance of vapours, like the greatest and thickest smoak, sometimes more, sometimes less: these vapours rise high in the air when it is calm, but are dispers'd by the wind when it blows hard. If you go nigh to this vapour or fog, or if the wind blows it on you, it is so penetrating, that in a few minutes you will be as wet as if you had been under water. I got two young *Frenchmen* to go down, to bring me from the side of the Fall at the bottom, some of each of the several kinds of herbs, stones, and shells they should find there; they returned in a few minutes, and I really thought they had fallen into the water: they were obliged to strip themselves quite naked, and hang their clothes in the sun to dry. When you are on the other East side of the Lake *Ontario*, a great many leagues from the Fall,

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you may, every clear and calm morning see the vapours of the Fall rising in the air; you

would think all the woods thereabouts were set on fire by the *Indians*, so great is the apparent smoak. In the same manner you may see it on the West side of the lake *Erie*, a great many leagues off.

Several of the *French* gentlemen told me, that when birds come flying into this fog or smoak of the fall, they fall down and perish in the Water; either because their wings are become wet, or that the noise of the fall astonishes them, and they know not where to go in the Dark: but others were of opinion, that seldom or never any bird perishes there in that manner; because, as they all agreed, among the abundance of birds found dead below the fall, there are no other sorts than such as live and swim frequently in the water; as swans,

geese, ducks, water-hens, teal, and the like. And very often great flocks of them are seen going to destruction in this manner: they swim in the river above the fall, and so are carried down lower and lower by the water, and as water-fowl commonly take great delight in being carry'd with the stream, so here they indulge themselves in enjoying this pleasure so long, till the swiftness of the water becomes so great, that 'tis no longer possible for them to rise, but they are driven down the precipice, and perish. They are observ'd when they

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draw nigh the fall, to endeavour with all their might, to take wing and leave the water, but they cannot. In the months of *September* and *October*, such abundant quantities of dead waterfowl are found every morning below the Fall, on the shore, that the garrison of the fort for a long time live chiefly upon them; besides the fowl, they find also several sorts of dead fish, also deer, bears, and other animals which have tried to cross the water above the fall; the larger animals are generally found broken to pieces. Just below the fall the water is not rapid, but goes all in circles and whirls like a boiling pot; which however doth not hinder the *Indians* going upon it in small canoes a fishing; but a little lower begins the smaller fall. When you are above the fall, and look down, your head begins to turn: the *French* who have been here 100 times, will seldom venture to look down, without at the same time keeping fast hold of some tree with one hand.

It was formerly thought impossible for any body living to come at the Island that is in the middle of the fall: but an accident that happen'd 12 years ago, or thereabouts, made it appear otherwise. The history is this. Two *Indians* of the *Six Nations* went out from

Niagara fort, to hunt upon an island that is in the middle of the river, or strait, above the great fall, on which there used to be abundance of deer. They took some *French* brandy with

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them, from the fort, which they tasted several times as they were going over the carrying place; and when they were in the canoe, they took now and then a dram, and so went along up the strait towards the Island where they propos'd to hunt; but growing sleepy, they laid themselves down in the canoe, which getting loose drove back with the stream, farther and farther down till it came nigh that island that is in the middle of the fall. Here one of them, awakened by the noise of the fall, cries out to the other, that they were gone! yet they try'd if possible to save life. This island was nighest, and with much working they got on shore there. At first they were glad; but when they had consider'd every thing, they thought themselves hardly in a better state than if they had gone down the fall, since they had now no other choice, than either to throw themselves down the same, or to perish with hunger. But hard necessity put them on invention. At the lower end of the island the rock is perpendicular, and no water is running there. This island has plenty of wood; they went to work directly and made a ladder or shrouds of the bark of lindentree, (which is very tough and strong,) so long 'till they could with it reach the water below; one end of this bark ladder they tied fast to a great tree that grew at the side of the rock above the fall, and let the other end down

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to the water. So they went down along their new-invented stairs, and when they came to the bottom in the middle of the fall, they rested a little; and as the water next below the fall is not rapid, as beforementioned, they threw themselves out into it, thinking to swim on shore. I have said before, that one part of the fall is on one side of the island, the other on the other side. Hence it is, that the waters of the two cataracts running against each other, turn back against the rock that is just under the island.

Therefore, hardly had the *Indians* began to swim, before the waves of the eddy threw them with violence against the rock from whence they came. They tried it several times, but at last grew weary; and being often thrown against the rock they were much bruised, and the skin of their bodies

torn in many places. So they were oblig'd to climb up their stairs again to the island, not knowing what to do. After some time they perceived *Indians* on the shore, to whom they cried out. These saw and pity'd them, but gave them little hopes of help: yet they made haste down to the fort, and told the command where two of their brethren were. He persuaded them to try all possible means of relieving the two poor *Indians*; and it was done in this manner. The water that runs on the east side of this island is shallow, especially

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a little above the island towards the eastern shore. The commandant caused poles to be made and pointed with iron: two *Indians* determined to walk to this island by the help of these poles, to save the other poor creatures, or perish themselves. They took leave of all their friends as if they were going to death. Each had two such poles in his hands, to set against the bottom of the stream, to keep them steady. So they went and got to the island, and having given poles to the two poor *Indians* there, they all returned safely to the main. Those two *Indians* who in the above mentioned manner were first brought to this island, are yet alive. They were nine days on the island, and almost starved to death.* —Now since the way to this island has been found, the *Indians* go there often to kill deer, which having tried to cross the river above the fall, were driven upon the island by the stream: but if the King of *France* would give me all *Canada*, I would not venture to go to this island; and were you to see it, Sir, I am sure you would have the same sentiment. On the west side of this island are some small islands or rocks of no consequence. The east

* These *Indians* had better fortune than 10 or 12 *Utorwawa's* who attempting to escape here the pursuit of their Enemies of the *Six Nations*, were carried down the Cataract, by the violence of the stream and every one perished. —No part even of their Canoe being ever seen again.

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side of the river is nearly perpendicular, the west side more sloping. In former times a part of the rock at the Fall which is on the west side of the island, hung over in such a manner, that the water which fell perpendicularly from it, left a vacancy below, so that people could go under between the rock and the water; but the prominent part some years since broke off and fell down; so that there is now no possibility of going between the falling water and the rock, as the water now

runs close to it all the way down.—The breadth of the Fall, as it runs into a semicircle, is reckon'd to be about 6 Arpents. The island is in the middle of the Fall, and from it to each side is almost the same breadth: the breadth of the island at its lower end is two thirds of an Arpent, or thereabouts.—

Below the Fall in the holes of the rocks, are great plenty of Eels, which the *Indians* and *French* catch with their hands without other means; I sent down two *Indian* boys, who directly came up with about twenty fine ones.—

Every day, when the Sun shines, you see here from 10 o'clock in the morning to 2 in the afternoon, below the Fall, and under you, when you stand at the side over the Fall, a glorious rainbow and sometimes two rainbows, one within the other.

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I was so happy to be at the Fall on a fine clear day, and it was with great delight I view'd this rainbow, which had almost all the colours you see in a rainbow in the air. The more vapours, the brighter and clearer is the rainbow. I saw it on the East side of the Fall in the bottom under the place where I stood, but above the water. When the wind carries the vapours from that place, the rainbow is gone, but appears again as soon as new vapours come. From the Fall to the landing above the Fall, where the canoes from Lake *Erie* put on shore, (or from the Fall to the upper end of the carrying-place) is half a mile. Lower the canoes dare not come, lest they should be obliged to try the fate of the two *Indians*, and perhaps with less success.—

They have often found below the Fall pieces of human bodies, perhaps of drunken *Indians*, that have unhappily come down the Fall. I

was told at *Oswego*, that in *October*, or thereabouts, such plenty of feathers are to be found here below the Fall, that a man in a days time can gather enough of them for several beds, which feathers they said came off the birds kill'd at the Fall. I ask'd the *French*, if this was true? They told me they had never seen any such thing; but that if the feathers were pick'd off the dead birds, there might be such a quantity.



T R A V E L S

THROUGH

NORTH & SOUTH CAROLINA,

GEORGIA,

EAST & WEST FLORIDA,

THE CHEROKEE COUNTRY, THE EXTENSIVE
TERRITORIES OF THE MUSCOGULGES,
OR CREEK CONFEDERACY, AND THE
COUNTRY OF THE CHACTAWS;

CONTAINING

AN ACCOUNT OF THE SOIL AND NATURAL
PRODUCTIONS OF THOSE REGIONS, TOGE-
THER WITH OBSERVATIONS ON THE
MANNERS OF THE INDIANS.

EMBELLISHED WITH COPPER-PLATES.

BY WILLIAM BARTRAM.

PHILADELPHIA:

PRINTED BY JAMES & JOHNSON,

M, DCC, XCI.

the establishment of the settlement. Mr. Mattock, who is now about seventy years of age, healthy and active, and presides as chief magistrate of the settlement, received us with great hospitality. The distance from Augusta to this place is about thirty miles; the face of the country is chiefly a plain of high forests savannas, and cane swamps, until we approach Little River, when the landscape varies, presenting to view high hills and rich vales. The soil is a deep, rich, dark mould, on a deep stratum of redish brown tenacious clay, and that on a foundation of rocks, which often break through both strata, lifting their backs above the surface. The forest trees are chiefly of the deciduous order, as, *Quercus tinctoria*, *Q. lafciniata*, *Q. alba*, *Q. rubra*, *Q. prinus*, with many other species; *Celtis*, *Fagus sylvatica*, and, on the rocky hills, *Fagus castanea*, *Fag. pumila*, *Quercus castanea*; in the rich vales, *Juglans nigra*, *Jug. cinerea*, *Gleditsia triacanthos*, *Magnolia acuminata*, *Liriodendron*, *Platanus*, *Fraxinus excelsior*, *Cercea*, *Juglans exaltata*, *Carpinus*, *Morus rubra*, *Calycanthus*, *Halesia*, *Aesculus pavia*, *Aesc. arborea*.

LEAVING the pleasant town of Wrightsborough, we continued eight or nine miles through a fertile plain and high forest, to the north branch of Little River, being the largest of the two, crossing which, we entered an extensive fertile plain, bordering on the river, and shaded by trees of vast growth, which at once spoke its fertility. Continuing some time through these shady groves, the scene opens, and discloses to view the most magnificent forest I had ever seen. We rise gradually a sloping bank of twenty or thirty feet elevation, and immediately entered this sublime forest; the ground is perfectly

a level green plain, thinly planted by nature with the most stately forest trees, such as the gigantic Black * Oak (*Q. tinctoria*) *Liriodendron*, *Juglans nigra*, *Platanus*, *Juglans exaltata*, *Fagus sylvatica*, *Ulmus sylvatica*, *Liquid-amber styraciflua*, whose mighty trunks, seemingly of an equal height, appeared like superb columns. To keep within the bounds of truth and reality, in describing the magnitude and grandeur of these trees, would, I fear, fail of credibility; yet, I think I can assert, that many of the black oaks measured eight, nine, ten, and eleven feet diameter five feet above the ground, as we measured several that were above thirty feet girth, and from hence they ascend perfectly straight, with a gradual taper, forty or fifty feet to the limbs; but, below five or six feet, these trunks would measure a third more in circumference, on account of the projecting jambs, or supports, which are more or less, according to the number of horizontal roots that they arise from: the Tulip tree, *Liquid-amber*, and *Beech*, were equally stately.

NOT far distant from the terrace, or eminence, overlooking the low grounds of the river, many very magnificent monuments of the power and industry of the ancient inhabitants of these lands are visible. I observed a stupendous conical pyramid, or artificial mount of earth, vast tetragon terraces, and a large sunken area, of a cubical form, encompassed with banks of earth; and certain traces of a large Indian town, the work of a powerful nation, whose period of grandeur perhaps long preceded the discovery of this continent.

* Gigantic Black Oak. *Querc. tinctoria*; the bark of this species of oak is found to afford a valuable yellow dye. This tree is known by the name of Black Oak in Pennsylvania, New-Jersey, New-York, and New-England.

AFTER four days moderate and pleasant travelling, we arrived in the evening at the Buffalo Lick. This extraordinary place occupies several acres of ground, at the foot of the S. E. promontory of the Great Ridge, which, as before observed, divides the rivers Savanna and Alamamaha. A large cane swamp and meadows, forming an immense plain, lies S. E. from it; in this swamp I believe the head branches of the great Ogeeche river take their rise. The place called the Lick contains three or four acres, is nearly level, and lies between the head of the cane swamp and the ascent of the Ridge. The earth, from the superficies to an unknown depth, is an almost white or cinerious coloured tenacious fattish clay, which all kinds of cattle lick into great caves, pursuing the delicious vein. It is the common opinion of the inhabitants, that this clay is impregnated with saline vapours, arising from fossil

salts deep in the earth; but I could discover nothing saline in its taste, but I imagined an insipid sweetness. Horned cattle, horses, and deer, are immoderately fond of it, inasmuch, that their excrement, which almost totally covers the earth to some distance round this place, appears to be perfect clay; which, when dried by the sun and air, is almost as hard as brick.

WE were detained at this place one day, in adjusting and planning the several branches of the survey. A circumstance occurred during this time, which was a remarkable instance of Indian sagacity, and had nearly disconcerted all our plans, and put an end to the business. The surveyor having fixed his compass on the staff, and about to ascertain the course from our place of departure, which was to strike Savanna river at the confluence of a



JAMES P. BECKWOURTH IN LUNTER'S COSTUME.

The night was spent in general rejoicing, in relating our adventures, and recounting our various successes and reverses. There is as much heartfelt joy experienced in falling in with a party of fellow-trappers in the mountains as is felt at sea when, after a long voyage, a friendly vessel just from port is spoken and boarded. In both cases a thousand questions are asked; all have wives, sweethearts, or friends to inquire after, and then the general news from the States is taken up and discussed.

The party we had fallen in with consisted of sixteen men. They had been two years out; had left Fort Yellow Stone only a short time previously, and were provided with every necessary for a long excursion. They had not seen the general, and did not know he was in the mountains. They had lost some of their men, who had fallen victims to the Indians, but in trapping had been generally successful. Our little party also had done extremely well, and we felt great satisfaction in displaying to them seven or eight packets of sixty skins each. We related to them the murder of Le Brache, and every trapper boiled with indignation at the recital. All wanted instantly to start in pursuit, and revenge upon the Indians the perpetration of their treachery; but there was no probability of overtaking them, and they suffered their anger to cool down.

The second day after our meeting, I proposed that the most experienced mountaineers of their party should return with Baptiste and myself to perform the burial

THE

LIFE AND ADVENTURES

OF

JAMES P. BECKWOURTH,

MOUNTAINEER, SCOUT, AND PIONEER,

AND

CHIEF OF THE CROW NATION OF INDIANS.

With Illustrations.

WRITTEN FROM HIS OWN DICTATION,

BY T. D. BONNER.

NEW YORK:

HARPER & BROTHERS, PUBLISHERS

FRANKLIN SQUARE

1856.

JAMES P. BECKWOURTH.

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rites of our friend. I proposed three men, with ourselves, as sufficient for the sixteen Indians, in case we should fall in with them, and they would certainly be enough for the errand if we met no one. My former comrades were too tired to return.

We started, and arrived at our unfortunate camp, but the body of our late friend was not to be found, though we discovered some of his long black hair clotted with blood.

On raising the traps which we had set before our precipitate departure, we found a beaver in every one except four, which contained each a leg, the beavers having amputated them with their teeth. We then returned to our companions, and moved on to Willow Creek, where we were handy to the *caches* of our rendezvous at the "Suck." It was now about June 1st, 1822.

Here we spent our time very pleasantly, occupying ourselves with hunting, fishing, target-shooting, foot-racing, gymnastic, and sundry other exercises. The other detachments now came in, bringing with them quantities of peltry, all having met with very great success.

witness the sport. By-and-by Grizzly came in sight, walking along as independently as an alderman elect. I allowed him to approach till he was within twenty paces, when I called out to him; he stopped suddenly, and looked around to ascertain whence the sound proceeded. As he arrested himself, I fired, and the ball entered his heart. He advanced ten or fifteen paces before he fell; the observers shouted to me to run, they forgetting in their excitement that I had not strength to move. The bear never stirred from where he fell, and he expired without a groan. When dressed, he weighed over fourteen hundred pounds.

The grizzly bear is a formidable animal, and has acted a prominent part among the settlers of California. They are seldom known to attack a man unless wounded; in that case, if a tree is by, the hunter had better commence climbing. They are very plenty from the Sierra Nevada to the coast range of mountains. I have, in the course of my sojourn in the country, killed a great many of them, and met with some singular adventures.

On one occasion, while I was with the Crow Indians, there was a man of the name of Coe who was trapping in one of the neighboring streams, and I became alarmed for his safety, as Black Foot parties were skulking about in all directions, and were sure to kill him if they should find his camp. I found Coe, and told him my fears. He instantly gathered up his traps, and, mounting his horse, started toward me. When within fair gun-shot, an old bear sprang from a thicket, and landed upon the flanks of his horse, applying his teeth to the roots of the poor animal's tail, and holding him as if in a vice. Coe leaned over his horse's neck, and cried out,



ATTACK OF A GRIZZLY BEAR.

THE HISTORY OF VIRGINIA, In Four PARTS.

- I. The HISTORY of the First Settlement of *Virginia*, and the Government thereof, to the Year 1706.
- II. The natural Productions and Conveniences of the Country, suited to Trade and Improvement.
- III. The Native *Indians*, their Religion, Laws, and Customs, in War and Peace.
- IV. The present State of the Country, as to the Polity of the Government, and the Improvements of the Land, the 10th of June 1720.

Robert Beverley

By a Native and Inhabitant of the PLACE.

The SECOND EDITION revis'd and enlarg'd by the AUTHOR.

L O N D O N :

Printed for F. FAYRAM and J. CLARKE at the Royal-Exchange, and T. BICKERTON in Pater-Noster-Row, 1722.

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§. 15. Grapes grow wild there in an incredible Plenty, and Variety; some of which are very sweet and pleasant to the taste, others rough and harsh, and, perhaps, fitter for Wine or Brandy. I have seen great Trees covered with single Vines, and those Vines almost hid with the Grapes. Of these wild grapes, besides those large ones in the Mountains, mention'd by *Batt* in his Discovery, I have observed four very different Kinds, viz.

1. One of these Sorts grows among the Sandbanks, upon the Edges of the low Grounds, and Islands next the Bay, and Sea, and also in the Swamps and Breaches of the Up-lands. They grow thin in small Bunches, and upon very low Vines. These are noble Grapes; and tho' they are wild in the Woods, are as large as the *Dutch Gooseberry*. One Species of them is white, others purple, blue, and black, but all much alike in Flavour, and some long, some round.

2. A second Kind is produced throughout the whole Country, in the Swamps and Sides of Hills. These also grow upon small Vines, and in small Bunches; but are themselves the largest Grapes as big as the *English* Bullace, and of a rank Taste when ripe, resembling the smell of a Fox, from whence they are called Fox-Grapes. Both these Sorts make admirable Tarts, being of a fleshy Substance, and perhaps, if rightly managed, might make good Raisins.

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120 *The natural Product, and*

The Melting of these Berries is said to have been first found out by a Surgeon in *New-England*, who perform'd wonderful Things, with a Salve made of them. This Discovery is very modern, notwithstanding these Countries have been so long settled.

The Method of managing these Berries is by boiling them in Water, till they come to be intirely dissolv'd, except the Stone, or Seed, in the Middle, which amounts in Quantity to about half the Bulk of the Berry; the biggest of which is something less than a Corn of Pepper.

There are also in the Plains, and rich low Grounds of the Freshes, abundance of Hops, which yield their Product without any Labour of the Husbandman, in Weeding, Hilling, or Poling.

§. 18. All over the Country, is intersper'd here and there, a surprizing Variety of curious Plants and Flowers. They have a Sort of Briar, growing something like the *Sarsaparilla*. The Berry of this is as big as a Pea, and as round, the Seed being of a bright Crimson Colour. It is very hard, and finely polish'd by Nature; so that it might be put to diverse ornamental Uses, as Necklaces are, &c.

There are several Woods, Plants and Earths, which have been fit for the Dying of curious Colours. They have the Puccoon and Musquaspén, two Roots, with which the *Indians* use to paint themselves red. And a Berry, which grows upon a wild Briar, dyes a handsome blue. There's the Shumack and the Sassafras, which make a deep Yellow. Mr. *Heriot* tells us of several others, which he found at *Pamtego*, and gives the *Indian* Names of them: But that Language being not understood by the *Virginians*, I am not able to distinguish which he means. Particularly he takes notice of

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Wasebur, an Herb; *Chapacour*, a Root; and *Tangomockonominge*, a Bark.

There's the Snake-Root, so much admired in *England* for a Cordial, and for being a great Antidote in all Pestilential Distempers.

There's the Rattle-Snake-Root, to which no Remedy was ever yet found comparable; for it effectually cures the Bite of a Rattle-Snake, which sometimes has been mortal in two Minutes. If this Medicine be early applied, it presently removes the Infection, and in two or three Hours, restores the Patient to as perfect Health, as if he had never been hurt.

The *James Town Weed* (which resembles the thorny Apple of *Peru*, and I take to be the Plant so call'd) is supposed to be one of the greatest Coolers in the World. This being an early Plant, was gather'd very young for a boil'd Salad, by some of the Soldiers sent thither, to quell the Rebellion of *Bacon*; and some of them eat plentifully of it, the Effect of which was a very pleasant Comedy; for they turn'd natural Fools upon it for several Days: One would blow up a Feather in the Air; another would dart Straws at it with much Fury; and another stark naked was sitting up in a Corner, like a Monkey, grinning and making Mows at them; a Fourth would fondly kiss, and paw his Companions, and sneer in their Faces, with a Countenance more antick, than any in a *Dutch* Doll. In this frantick Condition they were confined, lest they should in their Folly destroy themselves; though it was observed, that all their Actions were full of Innocence and good Nature. Indeed they were not very cleanly; for they would have wallow'd in their own Excrements, if they had not been prevented. A thousand such simple Tricks they play'd, and after eleven Days, return'd to themselves again, not remembling anything that had pass'd.

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CHAP. V

Of the FISH.

§. 21. AS for Fish, both of Fresh and Salt-Water, of Shell-Fish, and others, no Country can boast of more Variety, greater Plenty, or of better in their several Kinds.

In the Spring of the Year, Herrings come up in such abundance into their Brooks and Fords, to spawn, that it is almost impossible to ride through, without treading on them. Thus do those poor Creatures expose their own Lives to some Hazard, out of their Care to find a more convenient Reception for their Young, which are not yet alive. Thence it is, that at this Time of the Year, the Freshes of the Rivers, like that of the *Broadruck*, stink of Fish.

Besides these Herrings, there come up likewise into the Freshes from the Sea, Multitudes of Shads, Rocks, Sturgeon, and some few Lampreys, which fasten themselves to the Shad, as the *Remora* of *Imperatus* is said to do to the Shark of *Tiburone*. They continue their stay there about Three Months. The Shads at their first coming up are fat and fleshy; but they waste so extremely in Milting and Spawning,

ing, that at their going down they are poor, and seem fuller of Bones, only because they have less

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Flesh. It is upon this Account, (I suppose) that those in the *Severn*, which in *Gloucester* they call *Twaits*, are said at first to want those intermuscular Bones, which afterwards they abound with. As these are in the *Freshes*, so the *Salts* afford at certain Times of the Year, many other Kinds of Fish in infinite Shoals, such as the *Old-Wife*, a Fish not much unlike an *Herring*, and the *Sheep's-Head*, a Sort of Fish, which they esteem in the Number of their best.

§. 22. There is likewise great Plenty of other Fish all the Summer long; and almost in every Part of the Rivers, and Brooks, there are found of different Kinds: Wherefore I shall not pretend to give a Detail of them; but venture to mention the Names only of such as I have eaten and seen my self, and so leave the rest to those, that are better skill'd in Natural History. However, I may add, that besides all those that I have met with my self, I have heard of a great many very good sorts, both in the *Salts* and *Freshes*; and such People too, as have not always spent their Time in that Country have commended them to me, beyond any they had ever eat before.

Those which I know of my self, I remember by the Names, of *Herrings*, *Rocks*, *Sturgeons*, *Shads*, *Old-Wives*, *Sheep's-Heads*, *Black and red Drums*, *Trouts*, *Taylors*, *Green-Fish*, *Sun-Fish*, *Bals*, *Chub*, *Place*, *Flounders*, *Whitings*, *Fatbacks*, *Mails*, *Wives*, *Small-Turtle*, *Crabs*, *Oysters*, *Mussels*, *Cockles*, *Shrimps*, *Needle-Fish*, *Breme*, *Carp*, *Pike*, *Jack*, *Mullets*, *Eels*, *Conger-Eels*, *Perch*, and *Cats*, &c.

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The following Print, I may justly affirm to be a very true Representation of the *Indian Fishery*.

Tab. I. Represents the Indians in a Canoe with a Fire in the Middle, attended by a Boy and a Girl. In one End is a Net made of Silk Grass, which they use in Fishing their Weirs. Above is the Shape of their Weirs, and the Manner of setting a Weir-Wedge, across the Mouth of a Creek.

Note, That in Fishing their Weirs, they lay the Side of the Canoe to the Cods of the Weir, for the more convenient coming at them, and not with the End going into the Cods, as is set down in the Print: But we could not otherwise represent it here, lest we should have confounded the Shape of the Weir, with the Canoe.

In the Air you see a Fishing-Hawk flying away with a Fish, and a Bald-Eagle pursuing, to take it from him; the Bald-Eagle has always his Head and Tail white, and they carry such a Lustre with them, that the white thereof may be discern'd as far as you can see the Shape of the Bird; and seems, as if it were

without Feathers, and thence it has its Name Bald-Eagle.

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Water, and as they were flying away with their Quarry, the Bald-Eagles take it from them again. I have often observ'd the first of these hover over the Water, and rest upon the Wing some Minutes together, without the least Change of Place, and then from a vast Height dart directly into the Water, and there plunge down for the Space of half a Minute, or more, and at last bring up with him a Fish, which he could hardly rise with; then, having got upon the Wing again, he would shake himself so powerfully, that he threw the Water like a Mist about him; afterwards away he'd fly to the Woods with his Game, if he were not overlook'd by the Bald-Eagle, and robb'd by the Way, which very frequently happens. For the Bald-Eagle no sooner perceives a Hawk that has taken his Prey, but he immediately pursues, and strives to get above him in the Air, which if he can once attain, the Hawk for Fear of being torn by him, lets the Fish drop, and so by the Loss of his Dinner compounds for his own Safety. The poor Fish is no sooner loosed from the Hawk's Talons, but the Eagle shoots himself, with wonderful Swiftnes, after it, and catches it in the Air, leaving all further Pursuit of the Hawk, which has no other Remedy, but to go and fish for another.

Walking once with a Gentleman in an Orchard by the River-side, early in the Spring, before the Fish were by us perceiv'd to appear in Shoal-Water, or near the Shores, and before any had been caught by the People; we heard a great Noise in the Air just over our Heads, and looking up, we saw an Eagle in close Pursuit of a Hawk, that had a great Fish in his Pounces. The Hawk was as low as the Apple-trees, before he would let go his Fish, thinking to recover the Wood, which was just by, where the Eagles dare never follow,

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for Fear of bruising themselves. But, notwithstanding the Fish was drop'd so low, and tho' it did not fall above thirty Yards from us, yet we with our Hollowing, Running, and casting up our Hats, could hardly save the Fish from the Eagle, and if it had been let go two Yards higher,

he would have got it: But we at last took Possession of it alive, carried it Home, and had it dressed forthwith. It serv'd five of us very plentifully for a Breakfast, and some to the Servants. This Fish was a Rock near two Foot long, very fat, and a great Rarity for the Time of Year, as well as for the manner of its being taken.

These Fishing-Hawks, in more plentiful Seasons, will catch a Fish, and loiter about with it in the Air, on purpose to have Chace with an Eagle; and when he does not appear soon enough, the Hawk will make a sawcy Noise, and insolently defie him. This has been frequently seen, by Persons who have observ'd their Fishings.



CHAP. VI.

Of wild Fowl, and hunted Game.

§. 25. **A**S in Summer, the Rivers and Creeks are fill'd with Fish, so in Winter they are in many Places cover'd with Fowl. There are such a Multitude of Swans, Geese, Brants, Shel-drakes, Ducks of several Sorts, Mallard, Teal, Blewings, and many other Kinds of Water-Fowl, that the Plenty of them is incredible. I am but a small Sports-man, yet with a Fowling-Piece, have kill'd above twenty of them at a Shot. In like manner are the Mill-ponds, and great Runs in the

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Woods stor'd with these Wild-Fowl, at certain Seasons of the Year.

§. 26. The Shores, Marshy Grounds, Swamps, and Savanna's, are also stor'd with the like Plenty of other Game, of all Sorts, as Cranes, Curlews, Herons, Snipes, Woodcocks, Saurers, Ox-eyes, Plover, Larks, and many other good Birds for the Table that they have not yet found a Name for. Not to mention Beavers, Otters, Musk-Rats, Minxes, and an infinite Number of other wild Creatures.

§. 27. Altho' the inner Lands want these Benefits, (which, however, no Pond or Plash is without) yet even they have the Advantage of Wild Turkeys, of an incredible Bigness, Pheasants, Partridges, Pigeons, and an Infinity of small Birds, as well as Deer, Hairs, Foxes, Raccoons, Squirrels, Possums. And upon the Frontier Plantations, they meet with Bears, Panthers, Wild-Cats, Elks, Buffaloes, and Wild Hogs, which yield Pleasure, as well as Profit to the Sports-man. And tho' some of these Names may seem frightful to the *English*, who hear not of them in their own Country; yet they are not so there, for all these Creatures ever fly from the Face of Man, doing no

Damage but to the Cattle and Hogs, which the *Indians* never troubled themselves about.

Here I cannot omit a strange Rarity in the Female *Possum*, which I my self have seen. They have a false Belly, or loose Skin quite over the Belly; this never sticks to the Flesh of the Belly, but may be look'd into at all Times, after they have been concern'd in Procreation. In the Hind-part of this, is an Overture big enough for a small Hand to pass into: Hither the young ones, after they are full hair'd, and strong enough to run

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CHAP. XIX.

Of the Temperature of the Climate, and the Inconveniencies attending it.

§. 77. **T**HE Natural Temperature of the Inhabited part of the Country, is hot and moist: tho' this Moisture I take to be occa-

fion'd by the Abundance of low Grounds, Marshes, Creeks and Rivers, which are every where among their lower Settlements; but more backward in the Woods, where they are now seating, and making new Plantations, they have abundance of high and dry Land, where there are only Crystal Streams of Water, which flow gently from their Springs, in innumerable Branches, to moisten and enrich the adjacent Lands, and where a Fog is rarely seen,

§. 78. The Country is in a very happy Situation, between the extremes of Heat and Cold, but inclining rather to the first. Certainly it must be a happy Climate, since it is very near of the same Latitude with the Land of Promise. Besides, as the Land of Promise was full of Rivers, and Branches of Rivers; so is *Virginia*: As that was seated upon a great Bay and Sea, wherein were all the Conveniencies for Shipping and Trade; so is *Virginia*. Had that Fertility of Soil? So has *Virginia*, equal to any Land in the known World.

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In fine, if any one impartially considers all the Advantages of this Country, as Nature made it; he must allow it to be as fine a Place, as any in the Universe; but I confess I am aſham'd to say any thing of its Improvements, because I must at the same time reproach my Countrymen with unpardonable Sloth. If there be any Excuse for them in this Matter, 'tis the exceeding Plenty of good things, with which Nature has blest them; for where God Almighty is so merciful as to give Plenty and Ease, People easily forget their Duty.

All the Countries in the World, seated in or near the Latitude of *Virginia*, are esteem'd the fruitfulest and pleasantest of all Climates. As for Example, *Canaan*, *Syria*, *Persia*, great part of *India*, *China* and *Japan*, the *Morea*, *Spain*, *Portugal*, and the Coast of *Barbary*, none of which differ many Degrees of Latitude from *Virginia*. These are reckon'd the Gardens of the World, while *Virginia* is unjustly neglected by its own Inhabitants, and abus'd by other People.

§. 79. That which makes this Country most unfortunate, is, that it must submit to receive its Character from the Mouths not only of unfit, but very unequal Judges; for all its Reproaches happen after this manner.

Many of the Merchants and others, that go thither from *England*, make no Distinction between a cold and a hot Country; but wisely go sweltering about in their thick Cloaths all the Summer, because forsooth they used to do so in their *Northern* Climate; and then unfairly complain of the Heat of the Country. They greedily surfeit with their delicious Fruits, and are guilty of great Intemperance therein, through the exceeding Plenty thereof, and Liberty given by the Inhabitants; by which means they fall sick, and then unjustly com-

plain of the Unhealthiness of the Country. In the nett place, the Sailors for want of Towns there, were put to the Hardship of rowling most of the Tobacco, a Mile or more, to the Water-side; this splinters their Hands sometimes, and provokes them to curse the Country. Such Exercise and abright Sun made them hot, and then they imprudently fell to drinking cold Water, or perhaps new Cyder, which, in its Season they found in every Planter's House; or else they greedily devour'd the green Fruit, and unripe Trash they met with, and so fell into Fluxes, Fevers, and the Belly-Ach; and then, to spare their own Indiscretion, they in their Tarpawlin Language, cry, God D——m the Country. This is the true State of the Case, as to the Complaints of its being sickly; for, by the most impartial Observation I can make, if People will be persuaded to be temperate, and take due Care of themselves, I believe it is as healthy a Country, as any under Heaven: But the extraordinary Pleasantness of the Weather, and Plenty of the Fruit, lead People into many Temptations. The Clearness and Brightness of the Sky, add new Vigor to their Spirits, and perfectly remove all splenetick and sullen Thoughts. Here they enjoy all the Benefits of a warm Sun, and by their shady Trees are protected from its Inconvenience. Here all their Senses are entertain'd with an endless Succession of Native Pleasures. Their Eyes are ravished with the Beauties of naked Nature. Their

Ears are serenaded with the perpetual Murmur of Brooks, and the thorough-bass which the Wind plays, when it wantons through the Trees; the merry Birds too, join their pleasing Notes to this rural Comfort, especially the Mock-birds, who love Society so well, that often when they see Mankind, they will perch upon a Twig very near

them, and sing the sweetest wild Airs in the World. But what is most remarkable in these melodious Animals, if they see a Man takes Notice of them, they will frequently flie at small Distances, warbling out their Notes from Perch to Perch, be it Houle or Tree convenient, and sometimes too fly up, to light on the same again, and by their Musick, make a Man forget the Fatigues of his Mind. Men's

Taste is regaled with the most delicious Fruits, which without Art, they have in great Variety and Perfection. And then their Smell is refreshed with an eternal Fragrancy of Flowers and Sweets, with which Nature perfumes and adorns the Woods and Branches almost the whole Year round.

Have you Pleasure in a Garden? All things thrive in it most surprisngly; you can't walk by a Bed of Flowers, but besides the Entertainment of their Beauty, your Eyes will be saluted with the charming Colours and Curiosity of the humming Bird, which revels among the Flowers, and licks

off the Dew and Honey from their tender Leaves, on which it only feeds. Its Size is not half so large as an *English* Wren, and its Colour is a glorious shining Mixture of Scarlet, Green and Gold.

§. 80. On the other side, all the Annoyances and Inconveniencies of the Country, may fairly be summed up, under these three Heads, Thunder, Heat, and troublesome Vermine.

I confess, in the hottest part of the Summer, they have sometimes very loud and surprizing Thunder, but rarely any Damage happens by it. On the contrary, it is of such Advantage to the cooling and refining of the Air, that it is oftner wished for, than fear'd. But they have no Earthquakes, which the *Caribbee* Islands are so much troubled

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Their Heat is very seldom troublesome, and then only by the Accident of a perfect Calm, which happens perhaps two or three times in a Year, and lasts but a few Hours at a time; and even that Inconvenience is made easie by cool Shades, open airy Rooms, Summer-houses, Arbors, and Grottos: But the Spring and Fall afford as pleasant Weather, as *Mahomet* promis'd in his Paradise.

All the troublesome Vermine, that ever I heard any Body complain of, are either Frogs, Snakes, Musketæ's, Chinchies, Seed-ticks, or Red-worms, by some call'd Potato-lice. Of all which I shall give an Account in their Order.

Some People have been so ill inform'd, as to say, that *Virginia* is full of Toads, though there never yet was seen one Toad in it. The Marshes, Fens, and watery Grounds, are indeed full of harmless Frogs which do no Hurt, except by the Noise of their croaking Notes: But in the upper parts of the Country, where the Land is high and dry, they are very scarce.

In these Swamps and running Streams, they have Frogs of an incredible Bigness, which are called Bull-frogs, from the Roaring they make. Last Year I found one of these near a Stream of fresh Water, of so prodigious a Magnitude, that when I extended its Legs, I found the distance betwixt them, to be seventeen Inches and an half. If any are good to eat, these must be the Kind.

Some People in *England*, are startled at the very Name of the Rattle-Snake, and fancy every Corner of that Province so much pester'd with them, that a Man goes in constant Danger of his Life, that walks abroad in the Woods. But this is as gross a Mistake, as most of the other ill Reports of this Country. For in the first place, this Snake is very rarely seen; and when that happens, it never does the least Mischief, unless you offer

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to disturb it, and thereby provoke it to bite in its own Defence. But it never fails to give you fair Warning, by making a Noise with its Rattle, which may be heard at a convenient distance.

For my own part I have travelled the Country as much as any Man in it of my Age, by Night and by Day, above the Inhabitants, as well as among them; and yet before the first Impression of this Book I had never seen a Rattle-Snake alive, and at liberty, in all my Life. I had seen them indeed after they had been killed, or pent up in Boxes to be sent to *England*. The Bite of this Viper without some immediate Application is certainly Death; but Remedies are so well known, that none of their Servants are ignorant of them. I never knew any kill'd by these, or any other of their Snakes, although I had a general Knowledge all over the Country, and had been in every part of it. They have several other Snakes which are seen more frequently, and have very little or no Hurt in them, viz. such as they call Black-Snakes, Water-Snakes, and Corn-Snakes. The black Viper-Snake, and the Copper-bellied Snake, are said to be as venomous as the Rattle-Snake, but they are as seldom seen; these three poisonous Snakes bring forth their young alive, whereas the other three sorts lay Eggs, which are hatched afterwards; and that is the Distinction they make, esteeming only those to be venomous, which are viviparous. They have likewise the Horn-Snake, so called from a sharp Horn it carries in its Tail, with which it assaults anything that offends it, with that Force, that as it is said it will strike its Tail into the But-end of a Musquet, from whence it is not able to disengage it self.

All sorts of Snakes will charm both Birds and Squirrels, and the *Indians* pretend to charm them. Several Persons have seen Squirrels run down a

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Tree directly into a Snake's Mouth; they have likewise seen Birds fluttering up and down, and chattering at these Snakes, till at last they have dropt down just before them.

In the End of *May*, 1715, stopping at an Orchard by the Road-side to get some Cherries, being three of us in Company, we were entertain'd with the whole Process of a Charm between a Rattle-Snake and a Hare, the Hare being better than half grown. It happened thus; One of the Company in his Search for the best Cherries espied the Hare sitting, and altho' he went close by her she did not move, till he (not suspecting the occasion of her Gentleness) gave her a Lash with his Whip; this made her run about ten Foot, and there sit down again. The Gentleman not finding the Cherries ripe immediately return'd the same Way, and near the place where he struck the Hare, he spied a Rattle-Snake; still not suspecting the Charm, he goes back about twenty Yards to a Hedge to get a Stick to kill the Snake, and at his Return found the Snake removed, and coild in the same Place from whence he had moved the Hare. This put him into immediate Thoughts of looking for the Hare again, and he soon spied her about ten Foot off the Snake, in the same Place to which she had started

when he whipt her. She was now lying down, but would sometimes raise her self on her Fore-feet struggling as it were for Life or to get away, but could never raise her hinder parts from the Ground, and then would fall flat on her side again, panting vehemently. In this condition the Hare and Snake were when he called me: and though we all three came up within fifteen Foot of the Snake to have a full View of the whole, he took no notice at all of us, nor so much as gave a Glance towards us. There we stood at least half an Hour, the Snake not altering a Jot, but the Hare often

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struggling and falling on its side again, till at last the Hare lay still as dead for some time. Then the Snake mov'd out of his Coil, and slid gently and smoothly on towards the Hare, his Colours at that instant being ten times more glorious and shining than at other times. As the Snake mov'd along, the Hare happen'd to fetch another Struggle, upon which the Snake made a stop lying at his Length, till the Hare had lain quiet again for a short Space; and then he advanced again till he came up to the hinder parts of the Hare, which in all this Operation had been towards the Snake; there he made a Survey all over the Hare, raising part of his Body above it, then turn'd off and went to the Head and Nose of the Hare, after that to the Ears, took the Ears in his Mouth one after the other, working each apart in his Mouth as a Man does a Wafer to moisten it, then return'd to the Nose again, and took the Face into his Mouth, straining and gathering his Lips sometimes by one side of his Mouth, sometimes by the other: at the Shoulders he was a long time puzzled, often haling and stretching the Hare out at length, and straining forward first one side of his Mouth then the other, till at last he got the whole Body into his Throat. Then we went to him, and taking the Twist-Band off from my Hat, I made a Noose and put it about his Neck. This made him at length very furious, but we having secured him, put him into one End of a Waller, and carried him on Horse-back five Miles to Mr. *John Baylor's* House where we lodged that Night, with a Design to have sent him to Doctor *Cock* at *Williamsburgh*; but Mr. *Baylor* was so careful of his Slaves that he would not let him be put into his Boat for fear he should get loose and mischief them; therefore the next Morning we killed him, and took the Hare out of his Belly, the Head of the Hare began to

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be digested and the Hair falling off, having lain about eighteen Hours in the Snake's Belly.

I thought this Account of such a Curiosity would be acceptable, and the rather because tho' I live in a Country where such things are said frequently to happen, yet I never could have any satisfactory Ac-

count of a Charm, tho' I have met with several Persons who have pretended to have seen 'em. Some also pretend that those sort of Snakes influence Children, and even Men and Women, by their Charms. But this that I have related of my own View, I aver (for the Satisfaction of the learned) to be punctually true, without enlarging or wavering in any respect, upon the Faith of a Christian.

In my Youth I was a Bear-hunting in the Woods above the Inhabitants, and having straggled from my Companions, I was entertained at my Return, with the Relation of a pleasant Rencontre, between a Dog and a Rattle Snake, about a Squirrel. The Snake had got the Head and Shoulders of the Squirrel into his Mouth, which being something too large for his Throat, it took him up some time to moisten the Fur of the Squirrel with his Spawl, to make it slip down. The Dog took this Advantage, seiz'd the hinder parts of the Squirrel, and tug'd with all his Might. The Snake on the other side would not let go his Hold for a long time, till at last, fearing he might be bruised by the Dog's running away with him, he gave up his Prey to the Dog, the Dog eat the Squirrel, and felt no Harm.

Another Curiosity concerning this Viper, which I never met with in print, I will also relate from my own Observation.

Some time after my Observation of the Charm, my waiting Boy being sent abroad on an Errand also, took upon himself to bring home a Rattle-Snake in a Noose. I cut off the Head of this

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Snake, leaving about an Inch of the Neck with it; this I laid upon the Head of a Tobacco Hog-head, one *Stephen Lankford* a Carpenter, now alive, being with me. Now you must note, that these Snakes have but two Teeth, by which they convey their Poison, and they are placed in the upper Jaw, pretty forward in the Mouth, one on each side, these Teeth are hollow and crooked like a Cock's Spur; they are also loose or springing in the Mouth, and not fastned in the Jaw-bone as all the other Teeth are; the hollow has a vent also through by a small Hole a little below the Point of the Tooth; these two Teeth are kept lying down along the Jaw, or shut like a Spring-knife, and dont shrink up as the Talons of a Cat or Panther; they have also over them a lose thin Film or Skin of a Flesh-Colour, which rises over them when they are raised, which I take to be only at the Will of the Snake to do Injury; this Skin does not break by the rising of the Tooth only, but keeps whole till the Bite is given, and then is pierced by the Tooth, by which the Poison is let out. The Head being laid upon the Hog-head, I took two little Twigs or Splinters of Sticks, and having turn'd the Head upon its Crown, open'd the Mouth, and lifted up the Fang or springing Tooth on one side several times, in doing of which I at last broke the Skin, the Head gave a sudden Champ with its Mouth,

breaking from my Sticks, in which I observed that the Poison ran down in a Lump like Oyl, round the Root of the Tooth. Then I turn'd the other side of the Head, and resolv'd to be more careful to keep the Mouth open on the like occasion, and observe more narrowly the Consequence; for it is observed, that tho' the Heads of Snakes, Terrapins and such like Vermine be cut off, yet the Body will not die in a long time after; the general Saying, is till the Sun sets. After opening the Mouth

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on the other side, and lifting up that Fang also several times, he endeavour'd to give another Bite or Champ; but I kept his Mouth open, and the Tooth pierc'd the Film and emitted a Stream like one full of Blood in Blood-letting, and cast some Drops upon the Sleeve of the Carpenter's Shirt, who had no Waistcoat on. I advis'd him to pull off his Shirt, but he would not, and received no Harm; and tho' nothing could then be seen of it upon the Shirt, yet in washing there appeared five green Specks, which every washing appeared plainer and plainer, and lasted so long as the Shirt did, which the Carpenter told me was about three Years after. The Head we threw afterwards down upon the Ground, and a Sow came and eat it before our Faces; and received no Harm. Now I believe, had this Poison lighted upon any Place of the Carpenter's Skin, that was scratched or hurt, it might have poisoned him. I take the Poison to rest in a small Bag or Receptacle in the hollow at the Root of these Teeth; but I never had the Opportunity afterwards to make a farther Discovery of that.

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§. 93. The admirable Œconomy of the Beavers deserves to be particularly remembred. They cohabit in one House, are incorporated in a regular Form of Government, something like Monarchy, and have over them a Superintendent, which the *Indians* call *Pericu*. He leads them out to their several Employments, which consist in felling of Trees, biting off the Branches, and cutting them into certain Lengths, suitable to the Business they design them for, all which they perform with their Teeth. When this is done, the *Pericu* orders several of his Subjects to join together, and take up one of those Logs, which they must carry to their House or Damm, as Occasion requires. He walks in State by them all the while, and sees that every one bears his equal Share of the Burthen; while he bites with his Teeth, and lashes with his Tail, those that lag behind, and do not lend all their Strength; their way of Carriage is upon their Tail. They commonly build their Houses in Swamps, and then to raise the Water to a convenient Height, they make a Damm with Logs, and a binding sort of

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Clay so firm, that though the Water runs continually over, it cannot wash it away. Within these Damms they'll inclose Water enough to make a Pool like a Mill-pond; and if a Mill happen to be built on the same Stream, below their Damm, the Miller, in a dry Season, finds it worth his while to cut it, to supply his Mill with Water. Upon which Disaster the Beavers are so expert at their Work, that in one or two Nights time they will repair the Breach, and make it perfectly whole again. Sometimes they build their Houses in a broad Marsh, where the Tide ebbs and flows, and then they make no Damm at all. The Doors into their Houses are under Water. I have been at the Demolishing of one of these Houses, that was found in a Marsh, and was surprized to find it fortified with Logs, that were six Foot long, and ten Inches through, and had been carried at least one hundred and fifty Yards. This House was three Stories high, and contain'd five Rooms, that is to say, two in the lower, two in the middle Storie, and but one at the Top. These Creatures have a great deal of Policy, and know how to defeat all the Subtily and Stratagems of the Hunter, who seldom can meet with them, tho' they are in great Numbers all over the Country.

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Peaches and Nectarines I believe to be spontaneous, somewhere or other on that Continent; for the *Indians* have, and ever had greater Variety, and finer sorts of them than the *English*. The best sort of these cling to the Stone, and will not come off clear, which they call Plum-Nectarines, and Plum-Peaches, or Cling-Stones. Some of these are 12 or 13 Inches in the Girt. These sorts of Fruits are rais'd so easily there, that some good Husbands plant great Orchards of them, purposely for their Hogs; and others make a Drink of them, which they call Mobby, and either drink it as Cyder, or distill it off for Brandy. This makes the best Spirit next to Grapes.

Grape-Vines of the *English* Stock, as well as those of their own Production, bear most abundantly, if they are suffered to run near the Ground, and increase very kindly by slipping; yet very few have them at all in their Gardens, much less endeavour to improve them by cutting or laying. But since the first Impression of this Book, some Vineyards have been attempted, and one is brought to perfection, of 750 Gallons a Year. The Wine drinks at present greenish, but the Owner doubts not of good Wine, in a Year or two more, and takes great Delight that Way.

HISTORY

OF

BRITISH BIRDS.

THE FIGURES ENGRAVED ON WOOD BY T. BEWICK.

VOL. I.

CONTAINING THE

HISTORY AND DESCRIPTION OF LAND BIRDS.



NEWCASTLE:

PRINTED BY SOL. HODGSON, FOR BEILEY & BEWICK: SOLD BY THEM,
AND G. G. & J. ROBINSON, LONDON.

[Price 10s. 6d. in Boards.]

1797.

INTRODUCTION.

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them to search for and find their concealed food. To these tribes belong the Crane, the Heron, the Bittern, the Stork, the Spoonbill, the Woodcock, the Snipe, and many others.

Without the means of conveying themselves with great swiftness from one place to another, birds could not easily subsist: The food which Nature has so bountifully provided for them is so irregularly distributed, that they are obliged to take long journeys to distant parts in order to gain the necessary supplies; at one time it is given in great abundance; at another it is administered with a very sparing hand; and this is one cause of those migrations so peculiar to the feathered tribe. Besides the want of food, there are two other causes of migration, viz. the want of a proper temperature of air, and a convenient situation for the great work of breeding and rearing their young. Such birds as migrate to great distances are alone denominated *birds of passage*; but most birds are, in some measure, birds of passage, although they do not migrate to places remote from their former habitations. At particular times of the year most birds remove from one country to another, or from the more inland districts toward the shores: The times of these migrations or flights are observed with the most astonishing order and punctuality; but the secrecy of their departure and the suddenness of their re-appearance have involved the subject of migration in general in great difficulties. Much of this difficulty arises from our not being able to account for the means of subsistence during the long flights of many of those birds, which are obliged to cross immense tracts of water before they arrive at the places of their destination: Accustomed to measure distances by the speed of those animals with which we are well acquainted, we are apt to overlook the superior velocity with which birds are carried forward in the air, and the ease with which they continue their exertions for a much longer time than can be done by the strongest quadruped.

Our swiftest horses are supposed to go at the rate of a mile in somewhat less than two minutes, and we have one instance on record of a horse being tried, which went at the rate of near-

ly a mile in one minute, but that was only for the small space of a second of time.* In this and similar instances we find, that an uncommon degree of exertion was attended with its usual consequences, debility, and a total want of power to continue it to the same extent; but the case is very different with birds, their motions are not impeded by the same causes, they glide through the air with a quickness superior to that of the swiftest quadruped, and they can continue on the wing with the same speed for a considerable length of time. Now, if we can suppose a bird to go at the rate of only half a mile in a minute, for the space of twenty-four hours, it will have gone over, in that time, an extent of more than seven hundred miles, which is sufficient to account for almost the longest migration; but if aided by a favourable current of air, there is reason to suppose that the same journey may be performed in a much shorter space of time. To these observations we may add, that the flight of birds is peculiarly quick and piercing; and from the advantage they possess in being raised to considerable heights in the air, which is well known to be the case with the Stork, Bittern, and other kinds of birds, they are enabled, with a sagacity peculiar to instinctive knowledge, to discover the route they are to take, from the appearance of the atmosphere, the clouds, the direction of the winds, and other causes; so that, without having recourse to improbable modes, it is easy to conceive, from the velocity of their speed alone, that most birds may transport themselves to countries laying at great distances, and across vast tracts of ocean.

The following observations from Catesby are very applicable, and will conclude our remarks on this head: "The manner of their journeys may vary according as the structure of their bodies enables them to support themselves in the air. Birds with short wings, such as the Redstart, Black-cap, &c. may pass by gradual and slower movements; and there seems no necessity for a precipitate passage, as every day affords an in-

* See History of Quadrupeds, page 6, 3d edition.

it is not allowed us to unravel the mysterious workings of Nature through all her parts, or unfold her deep designs, we are, nevertheless, strongly led to the consideration of the means by which individuals, as well as species, are preserved and multiplied. The weak are frequently enabled to elude the pursuits of the strong, by flight or stratagem; some are screened from the pursuit of their enemies, by an arrangement of colours happily assimilated to the places which they most frequent, and where they find either food or repose; thus the Wrenneck is scarcely to be distinguished from the bark of the tree on which it feeds, or the Snipe from the soft and mossy ground by the springs of water which it frequents; the Great Plover finds its greatest security in stony places, to which its colours are so nicely adapted, that the most exact observer may be very easily deceived.

The attentive Ornithologist will not fail to discover numerous instances of this kind, such as the Partridge, Plover, Quail, &c. Some are indebted to the brilliancy of their colours as the means of alluring their prey; of this the Kingfisher is a remarkable instance, and deserves to be particularly noticed. This beautiful

bird has been observed, in some sequestered places, near the edge of a rivulet, exposing the vivid colours of its breast to the full rays of the sun, and fluttering with expanded wings over the smooth surface of the water; the fish, attracted by the brightness and splendour of the appearance, are detained whilst the wily bird darts down upon them with unerring certainty. We

do not say that the mode of taking fish by torch-light has been derived from this practised by the Kingfisher, but every one must be struck by the similarity of the means. Others, again, derive the same advantage from the simplicity of their exterior appearance; of this the Heron will serve as an example. He may frequently be seen standing motionless by the edge of a piece of water, waiting patiently the approach of his prey, which he never fails to seize as soon as it comes within reach of his long neck; he then resumes his former position, and continues to wait with the same patient attention as before.

Most of the smaller birds are supported, especially when



THE OSPREY.

BALD BUZZARD, SEA EAGLE, OR FISHING HAWK.

(*Falco Haliaetus*, Lin.—*Le Balbuzard*, Buff.)

The length of this bird is two feet; its breadth, from tip to tip, above five; its bill is black, with a blue cere, and its eye is yellow; the crown of its head is white, marked with oblong dusky spots; its cheeks, and all the under parts of its body, are white, slightly spotted with brown on its breast; from the corner of each eye a streak of brown ex-

tends down the sides of the neck toward the wing; the upper part of the body is brown; the two middle feathers of the tail are brown, the others are marked on the inner webs with alternate bars of brown and white; the legs are very short and thick, being only two inches and a quarter long, and two inches in circumference; they are of a pale blue colour; the claws black; the outer toe is larger than the inner one, and turns easily backward, by which means this bird can more readily secure its slippery prey.

Buffon observes that the Osprey is the most numerous of the large birds of prey, and is scattered over the extent of Europe, from Sweden to Greece, and that it is found even in Egypt and Nigritia. Its haunts are on the sea shore, and on the borders of rivers and lakes; its principal food is fish; it darts upon its prey with great rapidity, and with undeviating aim.

The Italians compare its descent upon the water to a piece of lead falling upon that element, and distinguish it by the name of *Augusta Piumbina*, or the *Leaden Eagle*. It builds its nest on the ground, among reeds, and lays three or four eggs, of an elliptical form, rather less than those of a hen. The Carolina and Cayenne Ospreys are varieties of this species.

THE GOLDEN-CRESTED WREN.

(*Motacilla regulus*, Lin.—*Le Roitelet*, Buff.)

THIS is supposed to be the least of all the European birds; it is certainly the smallest of the British kinds, being in length not quite three inches and a half,* and weighs only seventy-six grains:

Its bill is very slender and dark; eyes hazel; on the top of its head the feathers are of a bright orange colour, bordered on each side with black, which forms an arch above its eyes, and with which it sometimes conceals the crown, by contracting the muscles of the head; the upper part of the body is of a yellowish green or olive colour; all the un-

* The body, when stripped of its feathers, is not quite an inch long.—Buff.



HISTORY OF BRITISH BIRDS.

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VOL. II.

CONTAINING THE

HISTORY AND DESCRIPTION OF WATER BIRDS.



NEWCASTLE:

PRINTED BY EDWARD WALKER, FOR T. BEWICK: SOLD BY HIM, AND
LONGMAN AND REES, LONDON.

[Price 12s. in Board.]

1804.



BITTERN.

BOG-BUMPER, BITTER-BUM OR MIRE-DRUM.

(*Ardea Stellaris*, Lin.—*Le Butor*, Buff.)

THE Bittern is nearly as large as the common Heron; its legs are stronger, body more plump and fleshy, and its neck is more thickly clothed with feathers. The beak is strong at the base, straight, sharp on the edges, and gradually tapers to an acute point; the upper mandible is brown, the under inclining to green; the mouth is wide,



At the root of the first quill in each wing is a small-pointed narrow feather very elastic, and much sought after by painters, by whom it is used as a pencil. A feather of a similar kind is found in the whole of this tribe, and also in every one of the Tringas and Plovers which the author has examined. The annexed figure represents a scapular feather of the Woodcock.

WILD SWAN.

ELK, HOOPER, OR WHISTLING SWAN.

(*Anas Cygnus ferus*, Lin.—*Le Cygne sauvage*, Buff.)

THE Wild Swan measures five feet in length, and above seven in breadth, and weighs from thirteen to sixteen pounds. The bill is three inches long, of a yellowish white from the base to the middle, and thence to the tip, black: the bare space from the bill over the eye and eye-lids is yellow: the whole plumage in adult birds is of a pure white, and, next to the skin, they are clothed with a thick fine down: the legs are black.

This species generally keeps together in small flocks, or families, except in the pairing season, and at the setting in of winter. At the latter period they assemble in immense multitudes, particularly on the large rivers and lakes of the thinly inhabited northern parts of Europe, Asia, and America: but when the extremity of the weather threatens to become insupportable, in order to shun the gathering storm, they shape their course high in air, in divided and diminished numbers, in search of milder climates. In such seasons they are most commonly seen in various parts of the British isles, and in other more southern countries of Europe. The same is observed of them in the North American states. They do not, however, remain longer than

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till the approaching of the spring, when they again retire northward to the arctic regions to breed. A few, indeed, drop short, and perform that office by the way, for they are known to breed in some of the Hebrides, the Orkney, Shetland, and other solitary isles; but these are hardly worth notice: the great bodies of them are met with in the large rivers and lakes near Hudson's Bay, and those of Kamtschatka, Lapland, and Iceland. They are said to return to the latter place in flocks of about a hundred at a time in the spring, and also to pour in upon that island from the north, in nearly the same manner, on their way southward in the autumn.

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Buffon is of opinion that the Tame Swan has been

derived originally from the wild species; other naturalists entertain a contrary opinion, which they form chiefly on the difference between them in the singular conformation of the windpipe. Willoughby says, "The windpipe of the Wild Swan, after a strange and wonderful manner enters the breast-bone in a cavity prepared for it, and is therein reflected, and after its egrefs at the divarication is contracted into a narrow compass by a broad and bony cartilage, then being divided into two branches, goes on to the lungs: these branches before they enter the lungs, are dilated, and as it were swollen out into two cavities." Dr Heysham corroborates the above, and adds, that the Wild Swan, in this particular, differs not only from the Tame Swan, but also from every other bird. The only observable external difference between the two species is in the markings of the bill, (which are figured in the subjoined head) and in the Wild Swan's being of less bulk than the mute or tame kind.

Much has been said, in ancient times, of the singing of the Swan, and many beautiful and poetical descriptions have been given of its dying song.—"No fiction of natural history, no fable of anti-

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quity, was ever more celebrated, oftener repeated, or better received: it occupied the soft and lively imagination of the Greeks; poets, orators, and even philosophers, adopted it as a truth too pleasing to be doubted." "The dull insipid truth," however, is very different from such amiable and affecting fables, for the voice of the Swan, singly, is shrill, piercing, and harsh, not unlike the sound of a clarionet when blown by a novice in music. It is, however, asserted by those who have heard the united and varied voices of a numerous assemblage of them, that they produce a more harmonious effect, particularly when softened by the murmur of the waters.

At the setting in of frosty weather, the Wild Swans are said to associate in prodigious multitudes, and thus united, to use every effort to prevent the water from freezing: this they accomplish by the continual stir kept up amongst them; and by constantly dashing it with their extended wings, they are enabled to remain as long as it suits their convenience, in some favourite part of a lake or river which abounds with their food.

B. A. Gould, Jr., "The Progress of Astronomy During the Last Half Century" [Lecture VII in the Third Series of Lowell Lectures, for the 1851-1852 season. Reported in the Boston Daily Evening Traveller, VII, no. 260, Wednesday, Feb. 4, 1852, p. 1, cols. 4-5:

LOWELL LECTURES.

THIRD COURSE.

LECTURES BEFORE THE LOWELL INSTITUTE, BY A. GOULD, JR., F.R.S.

Reported for the Traveller.

SUBJECT—THE PROGRESS OF ASTRONOMY DURING THE LAST HALF CENTURY.

LECTURE VII.—TUESDAY, FEB. 3.

In the half of the course which remained, Mr. Gould stated, he intended to consider the results of the advances in means of astronomical investigation. For the sake of convenience he should give in the first place some account of the most brilliant result of the advances in each of the three departments of astronomy. The highest achievements of theoretical science were made evident by the history of those investigations which were connected with the discovery of Neptune. The group of asteroids called into being the new methods of numerical computation, at last had most severely tested their efficiency. The determination of the parallax of some of the fixed stars had been the immediate result of the highest refinement in instruments and methods of observation. This knowledge was due to the last half century, and almost to the last quarter century, and would, therefore, form appropriate subjects for three lectures, and illustrate principles already laid down.

The discovery of the parallax of some of the fixed stars was one of the greatest astronomical triumphs of this period. If one man should look at Bunker Hill from Fort Hill, and another at it from the State House, they would both see the same object, but from different directions—the one on his left, the other on his right. The difference of direction of any object thus seen from two different points was its parallax. In the consideration of distances between planets, reckoning was made from the centre of the earth; but, in considering the distances of systems, from the sun. Yet we were forced to observe from the earth, and the correction which would necessarily arise hence was called the annual parallax.

The word *fixed* was used in connection with *star* only in a relative sense. There was nothing fixed in all the universe. The stars of heaven moved ceaselessly and restlessly on. They were *apparent* motions of the stars, which were due only to motions of the earth. But there were other real motions, of different stars, affecting their position, which peculiar, individual motion was called their proper motion.

When two bodies were changing their relative position, it was impossible for an observer on one to decide, merely by observation, in which the motion really was. This was evident to all in every-day travelling, when the vehicle or boat seemed to stand still, and the ground or the water to move, where the opposite was the case. It was evidently impossible to decide,

solely from observation of the proper motion of any star, whether the real motion observed was that of the star itself, or of our solar system through space. It was but natural to suppose that, as satellites revolved around their planets, and the planets about the sun, so the sun might probably fill the relation of a planet to some vast colossal centre round which, with many others, it was moving. It had been demonstrated within the last half century that our sun, carrying with him his attendant planets, &c., was moving through space with great velocity, and the direction of this motion had recently been determined with very considerable precision. This might account somewhat for the change in the relative positions of the fixed stars. Thus three important problems were suggested by the proper motion of the fixed stars, the solution of each of which was intimately connected with that of the other.

The determination of the parallaxes of the fixed stars would lead to a knowledge of their distance. The largest proper motion yet detected in a fixed star of yearly change of position, was 7½ seconds, an amount inappreciable to the eye except where assisted by powerful telescopes. Arcturus, which had the greatest motion, had changed its position but 45 seconds since the earliest observation of it on record—that of Hipparchos in 130, B. C. a distance somewhat approximating to the breadth of the full moon. This extremely small change appears in the same direction from us often appeared to move in different directions from each other.

Mr. Gould here remarked on the inadequacy of imagination to comprehend the vastness of those distances which were reckoned by thousands of thousands of miles, and yet the astronomer proved these distances, and believed nothing but what he did prove.

The distance of Neptune was about 2,900,000,000 miles. The comet of March, 1843, departed to a distance of more than twice as far. Yet these inconceivable distances were but units in the reckoning of those mysterious stretches of space which intervened between the fixed stars and our system.

If in any triangle formed by straight lines, we knew three of the six parts—(three sides and three angles)—of which it consists, we could, provided one of the parts we had was a side, compute the other three. Thus if we knew the distance from Fort Hill to the State House, we could, by reckoning from the direction which the other two sides of the triangle take toward Bunker Hill, reckon its distance. An intricate network of such triangles was used in making the U. S. Coast Survey. Such a triangle, the vertices of which were at Berlin and at the Cape Good Hope, the distance of which places from each other was known, and formed one side of the triangle, gave us the means of determining the distance of the moon.

The distance of the earth from the sun rendered it impossible to get a sufficient angle on

the earth's surface for such a measurement, and astronomers therefore took advantage of the transit of Venus, and formed a triangle which had two of its vertices in the diameter of the earth's orbit and the other in the star.

The distance of the sun from the earth was the astronomical unit. In 6 months the earth moved to a distance of 2, or twice this unit, equal to 191,000,000 miles. There must therefore be a continual change in the relative positions of the fixed stars and the earth, although whether it was appreciable was another question. But the knowledge that it must exist had been one great stimulus to the attainment of the discovery of the parallaxes of some of the fixed stars.

The motion of the earth gave the orbit of the star an apparently elliptic form, while it was in fact the earth which moved in an ellipse, and by computing the angles formed by the earth and star from different points of the earth's vast orbit, we would be able to calculate the parallax of the star.

The first idea of the parallax of the fixed stars came from Galileo. The annual differences in the position of a star might be owing to regularly occurring annual phenomena, and it was therefore necessary in determining the parallax, to compare the motion of the star with that of some other star near it. Tycho Brahe, with his instruments could not detect any parallax of the pole star, and as subsequent knowledge showed there was a probable error of 1' in his instruments, and as a parallax of one minute would correspond to a distance of 3438 times that of the sun from the earth, it was evident the pole star was no nearer us than that distance. [In figures 330,048,000,000 miles.]

As instruments became improved, their errors became less, and they were capable of measuring greater distances. The probable error of Bradley's observations was five seconds, and as he could discover no parallax even with so little error, it became evident that the pole star was beyond the limit of his observations, or more than 41,250 times the distance of the sun from the earth. [Twelve times as far as was supposed from Tycho's observations.]

Up to 1837, numerous intelligent and skillful men undertook to determine the parallax of the

fixed stars, but without success. But excellent instruments had been constructed, and particularly those for Struve and Bessel, which were calculated to measure very small distances.—The limit of the uncertainty of the parallax of the fixed stars was reduced by these to one-tenth of a second of an arc, removing the limit of immeasurability to 2,062,648 times the distance of the sun from the earth, which was precisely analogous to the measurement of a line an inch long at the distance of 32 4-10ths miles.

Bessel and Struve, each, selected a star which they deemed appropriate. Bessel's star was 61 Cygni, which had two faint stars near it, one at the distance of 74 and the other 114. Between Aug., 1837, and Oct., 1838, he made 85 comparisons with the first star, and 98 with the second, — each comparison being the mean of 16 measurements on the same evening.

From the data thus obtained, after a laborious computation of the causes of error, Bessel concluded that the annual parallax of 61 Cygni differed from that of the first star 37-100ths of a second, and from that of the second by 26-100ths of a second. A second series of observations completed in March, 1840, corrected the errors of the former, and the parallax of 61 Cygni was settled beyond dispute as the 348-1000ths part of the second of an arc, the probable error of which was not more than 9-1000ths of a second, which would give the star in question a distance of 692,716 times the distance of the sun from the

earth. An idea of this distance might be gained from the fact that, if we were to construct a scale, on which one inch should represent the 96,000,000 of miles of the astronomical unit, or distance of the sun from the earth, the scale would have to be over nine miles long to represent the distance of the star 61 Cygni from the earth.

The star selected by Struve was the highest star Vega in the constellation of the Lyre. This had also a small companion at the distance of 43". This small star has no proper perceptible motion, and must have been perhaps still more distant. The result was that the parallax of the bright star was decided by Struve to be 262-1000ths of a second, giving a distance one-fourth greater than that of 61 Cygni. The true parallax of this star, however, had formed a subject of discussion, and Prof. Hubbard, with the improved prime-vertical instrument at Washington was engaged in a series of observations of the Lyra star, on a new method, with a view to a final settlement of the dispute. Those observations would not be made public for a year or two, till they were perfected.

Mr. Gould concluded his lecture with a reference to the discovery of the parallax of a star (Centauri) by Prof. Henderson, which was only one-third as far from us as 61 Cygni, having a parallax of one second. Mr. Maclear had reduced it to nine-tenths of a second.

VOL. VII—NO 260.

DAILY EVENING TRAVELLER

PUBLISHED BY

WORTHINGTON, FLANDERS & CO.

FERDINAND ANDREWS AND GEORGE FUNKHARD,
EDITORS.

TERMS—\$5.00 A YEAR, STRICTLY IN ADVANCE.
SINGLE COPIES, TWO CENTS.

Office, Traveller Buildings, corner of State
and Congress streets.

ALSO PUBLISHED AT THE SAME OFFICE—The American Traveller, Semi-Weekly, on TUESDAYS and FRIDAYS, at \$2 per annum; and the American Traveller, Weekly, on THURSDAYS, at \$3 per annum—all strictly in advance.

Daily Evening Traveller.

BOSTON:

WEDNESDAY, FEBRUARY 4, 1858.

HISTORY OF PLYMOUTH PLANTATION.

BY

WILLIAM BRADFORD,
THE SECOND GOVERNOR OF THE COLONY.

NOW FIRST PRINTED FROM THE ORIGINAL MANUSCRIPT.

FOR

THE MASSACHUSETTS HISTORICAL SOCIETY.

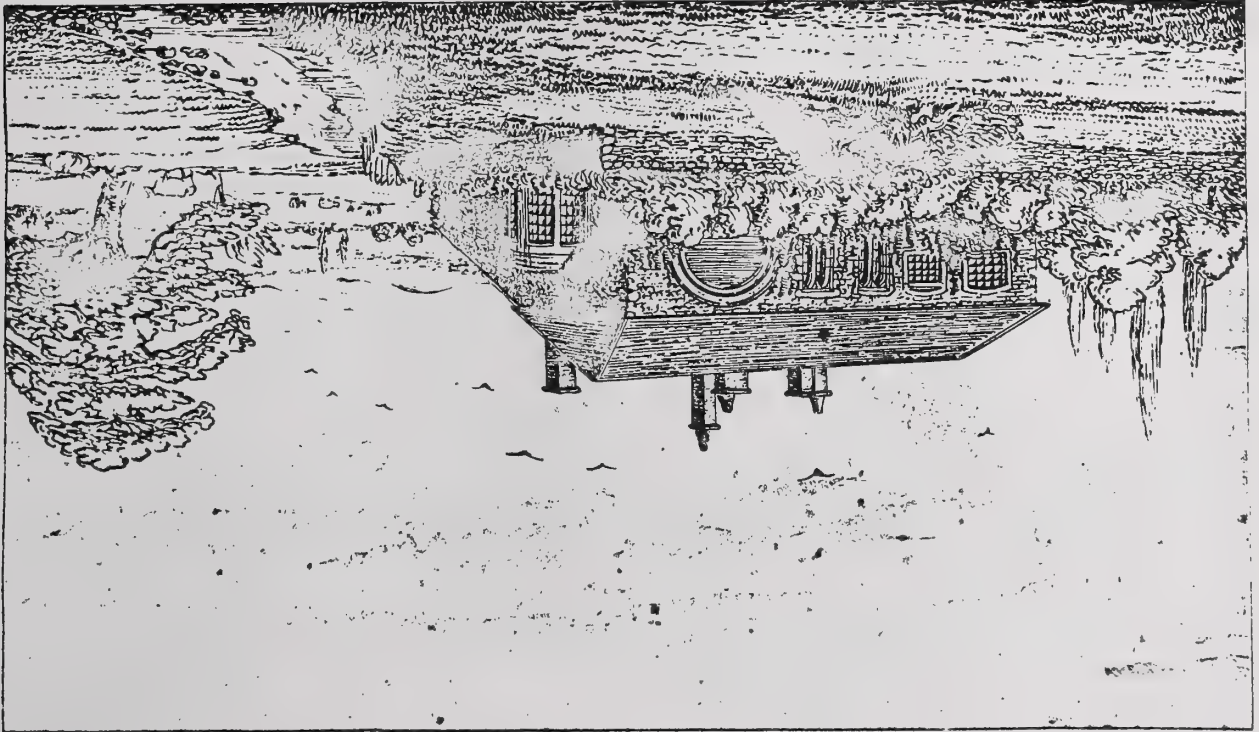
PUBLISHED AT THE CHARGE OF THE APPLETON FUND.

BOSTON:

PUBLISHED FOR THE SOCIETY,

By LITTLE, BROWN, AND COMPANY.

1856.



THE ARCHBISHOPAL PALACE AT SCRIBBY
THE RESIDENCE OF WILLIAM BRADFORD THE PILGRIM FATHER

From a drawing by A. M. Platts

W. H. R. H. H. H. H. H.

hard, yet they shoot not. Coming to their place,* they clapt up their house quickly, and landed their provisions, and left y^e companie appoynted, and sent the barke home; and afterwards palisadoed their house aboute, and fortified them selves better. The Dutch sent word home to y^e Monhatas what was done; and in proces of time, they sent a band of aboute 70. men, in warrlike maner, with collours displayed, to assaulte them; but seeing them strengtened, & that it would cost blood, they came to parley, and returned in peace. And this was their entrance ther, who deserved to have held it, and not by freinds to have been thrust out, as in a sorte they were, as will after appere. They did y^e Dutch no wrong, for they took not a foote of any land they bought, but went to y^e place above them, and bought that tracte of land which belonged to these Indeans which they carried with them, and their freinds, with whom y^e Dutch had nothing to doe. But of these matters more in another place.

It pleased y^e Lord to visite them this year with an infectious fevoure, of which many fell very sicke, and upward of 20. persons dyed, men and women, besids children, and sundry of them of their anciente friends which had lived in Holand; as Thomas Blossome, Richard Master-son, with sundry [198] others, and in y^e end (after he had much helped others) Samuell Fuller, who was their surgeon & phisition, and had been a great help and comforte unto them; as in his facultie, so otherwise, being a deacon of y^e church, a man godly, and forward to doe good, being much missed after his death; and he and y^e rest of their brethren much lamented by them, and caused much sadnes & mourning amongst them; which caused them to

* This was on the site of the present town of Windsor, and was the commencement of the English settlements in Connecticut. The Dutch authorities say this was on the 16th of September. Trumbull says it was in October. Winslow says he "had a place given

(the place we after possessed) the year before the Dutch began in the river; the Dutch came in by way of prevention." Brodhead's New York, p. 241: Davis's ed. of the Memorial, Appendix, p. 395. — Ed.

S^r: Having, upon y^e consideration of your letter, with y^e message you sente, had some serious consultations aboute y^e great importance of your bussines with y^e French, we gave our answer to those whom you deputed to conferr wth us aboute y^e viage to Penobscote. We shewed our willingnes to help, but withall we declared our presente condition, & in what state we were, for our abilitie to help; which we for our parts shall be willing to improve, to procure you sufficiente supply of men & munition. But for matter of moneys we have no authority at all to promise, and if we should, we should rather disapoynte you, then encourage you by y^e help, which we are not able to performe. We likewise thought it fitt to take y^e help of other Esterne plantations; but those things we leave to your owne wisdomes. And for other things we refer you to your owne committies, who are able to relate all y^e passages more at large. We salute you, & wish you all good success in y^e Lord.

Your faithfull & loving friend,

R^r: BELLINGHAM, Dep:

In y^e name of y^e rest of the Comities.

Boston, Octob^r 16. 1635.

humble them selves, & seeke y^e Lord; and towards winter it pleased the Lord y^e sicknes ceased. This disease allso swept away many of y^e Indeans from all y^e places near adjoining; and y^e spring before, espetially all y^e month of May, ther was such a quantitie of a great sorte of flies, like (for bignes) to wasps, or bumble-bees, which came out of holes in y^e ground, and replenished all y^e woods, and eate y^e green-things, and made such a constante yelling noyes, as made all y^e woods ring of them, and ready to deafe y^e hearers.* They have not by y^e English been heard or seen before or since. But y^e Indeans tould them y^e sicknes would follow, and so it did in June, July, August, and y^e cheefe heat of so^mer.

It pleased y^e Lord to inable them this year to send home a great quantity of beaver, besids paing all their charges, & debts at home, which good returne did much encourage their freinds in England. They sent in beaver 336^h. waight, and much of it coat beaver, which yeeld 20^s. p^r pound, & some of it above; and of otter-skins † 346. sould also at a good prise. And thus much of y^e affairs of this year.

Anno Dom: 1634.

This year M^r. Thomas Prence was chosen Gov^t.‡

M^r. Sherleys letters were very breefe in answer of theirs this year. I will forbear to copy any part therof, only name a head or 2. therin. First, he desirs they will take nothing ill in what he formerly write, professing his good

* "The insect here described," remarks Judge Davis, "is the *Cicada septendecim* of Linnæus, commonly called the locust. They have frequently appeared since, after long intervals, generally about seventeen years, indicated by the Linnæan specific name." Davis's ed. of the Memorial, p. 174, and Appendix, pp. 396-400; Harris's Report

on the Insects of Massachusetts, pp. 165-174. — Ed.

† The skin was sold at 14^s. & 15. y^e pound.

‡ The Assistants this year were William Bradford, Edward Winslow, Miles Standish, William Collier, John Alden, John Howland, and Stephen Hopkins. Morton's Memorial. — Ed.

This thing did not only thus breake of, but some of their merchants shortly after sent to trad with them, and furnished them both with provisions, & powder & shott; and so have continued to doe till this day, as they have seen opportunitie for their profite. So as in truth y^e English them selves have been the cheefest supporters of these French; for besids these, the plantation at Pemaquid* (which lyes near unto them) doth not only supply them with what y^e wante, but gives them continuall intelli-

* A settlement is said to have been made at Pemaquid as early as 1623, or 1624. In 1626, according to his deposition sworn to in 1662, Abraham Shurte came over as agent of Eldridge and Aldsworth, who in 1631-2 had a grant of Pemaquid from the Council, and resided here for many years, and was superintendent and chief magistrate of the settlement. See William-son's Maine, I. 241, 242, 603, 694; Winthrop, I. 61, 79. — Ed.

gence of all things that passes amonge y^e English, (espetially some of them,) so as it is no marvell though they still grow, & inroach more & more upon y^e English, and

fill y^e Indeans with gunes & munishton, to y^e great deanger of y^e English, who lye open & unfortified, living upon husbandrie; and y^e other closed up in their forts, well fortified, and live upon trade, in good securitie. If these things be not looked too, and remeady provided in time, it may easily be conjectured what they may come too; but I leave them.

This year, y^e 14. or 15. of August (being Saturday*) was such a mighty storme of wind & raine, as none living in these parts, either English or Indeans, ever saw. Being like (for y^e time it continued) to those Hauricanes and Tuffons that writers make mention of in y^e Indeas. It began in y^e morning, a litle before day, and grue not by degrees, but came with violence in y^e begining, to y^e great amasmente of many. It blew downe sundry [211] houses, & uncovered others; diverce vessells were lost at sea, and many more in extreme danger. It caused y^e sea to swell (to y^e southward of this place) above 20. foote, right up & downe, and made many of the Indeans to clime into trees for their saftie; it tooke of y^e barded rooffe of a house which belonged to the plantation at Manamet, and floted it to another place, the posts still standing in y^e ground; and if it had continued long without y^e shifting of y^e wind, it is like it would have drowned some parte of y^e cuntrie. It blew downe many hundered thowsands of trees, turning up the stronger by the roots, and breaking the hiegher pine trees of in the midle, and y^e tall yonge

* Saturday was the 15th of August. Winthrop erroneously records it under the 16th. During this same tempest, Anthony Thatcher was shipwrecked in going from Ipswich to Marblehead in a bark belonging to Mr. Allerton, containing twenty-three persons, all but two of whom perished. The James, of Bristol (Eng.), with one hundred passengers, among whom were Richard Mather and Jonathan Mitchell, was met by this storm in coming upon our coast, and barely escaped destruction. See Young's Chronicles of Massachusetts, pp. 473-476, 485-495; Winthrop, l. 164-166. — Ed.

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[1635]

oaks & walnut trees of good biggnes were wound like a withe, very strang & fearfull to behould. It begane in y^e southeast, and parted toward y^e south & east, and vered sundry ways; but y^e greatest force of it here was from y^e former quarters. It continued not (in y^e extremitie) above 5. or 6. howers, but y^e violence begane to abate. The signes and marks of it will remaine this 100. years in these parts wher it was sorest. The moone suffered a great eclips the 2. night after it.

Some of their neighbours in y^e Bay, hereing of y^e fame of Conightecute River, had a hankering mind after it, (as was before noted,) and now understanding that y^e Indeans were swepte away with y^e late great mortalitie, the fear of whom was an obstacle unto them before, which being now taken away, they begane now to prosecute it with great egermes. The greatest differances fell betweene those of Dorchester plantation and them hear; for they set their minde on that place, which they had not only purchased of y^e Indeans, but wher they had builte; intending only (if they could not remove them) that they should have but a smale moyety left to y^e house, as to a single family; whose doings and proceedings were conceived to be very injurious, to attempte not only to intrude them selves into y^e rights & possessions of others,

but in effect to thrust them out of all. Many were y^e leters & passages that went betweene them hear aboute, which would be to long here to relate.

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[1639-1640]

A cow-calfe usually at 10^h. A milch goate at 3^h. & some at 4^h. And femall kids at 30^h. and often at 40^h. a peece. By which means y^e anciente planters which had any stock begane to grow in their estats. Corne also wente at a round rate, viz. 6^h. a bushell. So as other trading begane to be neglected; and the old partners (having now forbidden M^r. Sherley to send them any more goods) broke of their trade at Kenebeck, and, as things stood, would follow it no longer. But some of them, (with other they joynd with,) being loath it should be lost by discontinuance, agreed with y^e company for it, and gave them aboute y^e 6. parte of their gaines for it; [230] with y^e first fruits of which they builte a house for a prison; and the trade ther hath been since continued, to y^e great benefite of y^e place; for some well fore-sawe that these high prises of corne and catle would not long continue, and that then y^e comodities ther raised would be much missed.

This year, aboute y^e 1. or 2. of June,* was a great & fearfull earthquake; it was in this place heard before it was felte. It came with a rumbling noyse, or low murmure, like unto remoate thunder; it came from y^e norward, & pased southward. As y^e noyse aproched nerer, they earth begane to shake, and came at length with that violence as caused platters, dishes, & such like things as stoode upon shelves, to clatter & fall downe; yea, persons were afraid of y^e houses them selves. It so fell oute y^e at y^e same time diverse of y^e cheefe of this towne were mett together at one house, conferring with some of their freinds that were upon their removall from y^e place, (as if y^e Lord would herby shew y^e signes of his displeasure, in their shaking a peeeces & removalls one from an other.)

* Winthrop and Johnson notice this earthquake as occurring on the 1st of June. — Ed.

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[1639-1640]

How ever it was very terrible for y^e time, and as y^e men were set talking in y^e house, some women & others were without y^e dores, and y^e earth shooke with y^e violence as they could not stand without catching hould of y^e posts & pails y^e stood next them; but y^e violence lasted not long. And about halfe an hower, or less, came an other noyse & shaking, but nether so loud nor strong as y^e former, but quickly passed over; and so it ceased. It was not only on y^e sea coast, but y^e Indeans felt it within land; and some ships that were upon y^e coast were shaken by it. So powerfull is y^e mighty hand of y^e Lord, as to make both the earth & sea to shake, and the mountaines to tremble before him, when he pleases; and who can stay his hand? It was observed that y^e somers, for divers years togeather after this earthquake, were not so hotte & seasonable for y^e ripping of corne & other fruits as formerly; but more could & moyst, & subjecte to erly & untimly frosts, by which, many times, much Indean corne came not to maturitie; but whether this was any cause, I leave it to naturallists to judge.

Harper's Stereotype Edition.

LETTERS

ON

NATURAL MAGIC.

ADDRESSED TO

SIR WALTER SCOTT, BART.

BY

SIR DAVID BREWSTER, K.H.
LL.D. F.R.S. V.P.R.S.E. &c. &c.

NEW-YORK:

PUBLISHED BY HARPER & BROTHERS,
NO. 82 CLIFF-STREET.

1836.

rapidly through the solid, and the other more slowly through the air. The same property is well illustrated by an elegant and easily repeated experiment of Chladni's. When sparkling champaign is poured into a tall glass till it is half full, the glass loses its power of ringing by a stroke upon its edge, and emits only a disagreeable and puffy sound. This effect will continue while the wine is filled with bubbles of air, or as long as the effervescence lasts; but when the effervescence begins to subside, the sound becomes clearer and clearer, and the glass rings as usual when the air-bubbles have vanished. If we reproduce the effervescence by stirring the champaign with a piece of bread, the glass will again cease to ring. The same experiment will succeed with other effervescing fluids.

The difference in the audibility of sounds that pass over homogeneous and over mixed media is sometimes so remarkable as to astonish those who witness it. The following fact is given on the evidence of an officer who observed it:—When the British and the American forces were encamped on each side of a river, the outposts were so near that the form of individuals could be easily distinguished. An American drummer made his appearance, and began to beat his drum, but though the motion of his arms were distinctly seen, not a single sound reached the ear of the observer. A coating of snow that had newly fallen upon the ground, and the thickness of the atmosphere, had conspired to obstruct the sound. An effect the very reverse of this is produced by a coating of glazed or hardened snow, or by an extended surface of ice or water. Lieutenant Foster was able to carry on a conversation with a sailor across Port Bowen harbour, a distance of no less than a mile and a quarter, and the sound of great guns has been heard at distances varying from 120 to 200 miles. Over hard and dry ground of a uniform character, or where a thin soil rests

upon a continuous stratum of rock, the sound is heard at a great distance, and hence it is the practice among many Eastern tribes to ascertain the approach of an enemy by applying the ear to the ground.

Many remarkable phenomena in the natural world are produced by the reflection and concentration of sound. Every person is familiar with the ordinary *echo* which arises from the reflection of sound from an even surface, such as the face of a wall, of a house, of a rock, of a hill, or of a cloud. As sound moves at the rate of 1090 feet in a second, and as the sound which returns to the person who emits it has travelled over a space equal to twice his distance from the reflecting surface, the distance in feet of the body which occasions the echo may be readily found by multiplying 545 by the number of seconds which elapse between the emission of the sound and its return in the form of an echo. This kind of echo, where the same person is the speaker and the hearer, never takes place unless when the observer is immediately in front of the reflecting surface, or when a line drawn from his mouth to the flat surface is nearly perpendicular to it, because in this case alone the wave of sound is reflected in the very same direction from the wall in which it reaches it. If the speaker places himself on one side of this line, then the echo will be heard most distinctly by another person as far on the other side of it, because the waves of sound are reflected like light, so that the angle of incidence, or the inclination at which the sound falls upon the reflected surface, is equal to the angle of reflection, or the inclination at which the sound is returned from the wall. If two persons, therefore, are placed before the reflecting wall, the one will hear the echo of the sound emitted by the other, and obstacles may intervene between these two persons so that neither of them hears the direct sound emitted by the other; in the same manner as

LEAVES

FROM THE

NOTE BOOK OF A NATURALIST.

BY

W. J. BRODERIP, ESQ., F. R. S.

ETC. ETC. ETC.

AUTHOR OF "ZOOLOGICAL RECREATIONS," ETC. ETC.

Farewell, farewell! but this I tell
To thee, thou Wedding-Guest:
He prayeth well, who loveth well
Both man and bird and beast.
The Ancient Mariner.

BOSTON:
PUBLISHED BY E. LITTELL & CO.
NEW YORK; G. P. PUTNAM.

1852.

his teeth and chaws. Now when he is lulled as it were fast asleep with this pleasure and contentment of his; the rat of India, or ichneumon, spieth his vantage, and seeing him lye thus broad gaping, whippeth into his mouth, and shooteth himselfe downe his throat as quicke as an arrow, and then gnaweth a hole through his belly, and so killeth him.*

Scaliger, somewhat scandalized that Pliny had made the bird a wren, was of opinion that it should be described; and the trochilus then came out of the size of a thrush, with an acute crested feather, which it had the power of erecting, so as to prick the palate of the crocodile if he should close his jaws and shut her in. Aldrovand backs this doctrine by a reference to Leo's work on Africa, who declares that he saw on the banks of islands in the middle of the Nile crocodiles sunning themselves, and birds, about the size of a thrush, flitting about them; but after a short space the birds flew away. His inquiries were answered by a statement that portions of the fishes and other animals on which the crocodile feeds stick about his teeth and breed worms, to his great torment. The birds, perceiving the worms when the crocodile gapes, come to feed upon them. But the crocodile, as soon as he finds that all the worms are eaten up, closes his mouth, and attempts to swallow the bird that has entered, but, being wounded by the sharp spine with which the head of the bird is armed, gapes again and sets the winged prisoner free.

The narrative of Herodotus has received corroboration from the pen of the accomplished author of *Visits to Monasteries in the Levant*.†

I will relate (says Mr. Curzon, in that amusing and interesting book) a fact in natural history which I was fortunate enough to witness, and which, although it is mentioned so long ago as the times of Herodotus, has not, I believe, been often observed since: indeed, I have never met with any traveller who has himself seen such an occurrence.

I had always a strong predilection for crocodile-shooting, and had destroyed several of these dragons of the waters. On one occasion I saw, a long way off, a large one, twelve or fifteen feet long, lying asleep under a perpendicular bank, about ten feet high, on the margin of the river. I stopped the boat at some distance; and noting the place as well as I could, I took a circuit inland, and came down cautiously to the top of the bank, whence with a heavy rifle I made sure of my ugly game. I had already cut off his head in my imagination, and was considering whether it should be stuffed with its mouth open or shut. I peeped over the bank; there he was within ten feet of the sight of the rifle. I was on the point of firing at his eye, when I observed that he was attended by a bird called a zic-zac. It is of the plover species, of a grayish color, and as large as a small pigeon.

The bird was walking up and down close to the crocodile's nose. I suppose I moved, for suddenly it saw me, and instead of flying away, as any respectable bird would have done, he jumped up about a foot from the ground, screamed "Zic-zac!

zic-zac!" with all the powers of his voice, and dashed himself against the crocodile's face two or three times. The great beast started up, and immediately spying his danger, made a jump into the air, and, dashing into the water with a splash which covered me with mud, he dived into the river and disappeared. The zic-zac to my increased admiration—proud, apparently, of having saved his friend—remained walking up and down, uttering his cry, as I thought, with an exulting voice, and standing every now and then on the tips of his toes in a conceited manner, which made me justly angry with his impertinence. After having waited in vain for some time, to see whether the crocodile would come out again, I got up from the bank where I was lying, threw a clod of earth at the zic-zac, and came back to the boat, feeling some consolation for the loss of my game in having witnessed a circumstance the truth of which has been disputed by several writers on natural history.

The crocodile's protector was actuated, doubtless, by that self-interest which governs so many social compacts; and Herodotus, when he describes the bird as freeing the crocodile from his troublesome parasites, only records an alliance which is far from uncommon in the history of animals. To say nothing of the familiar instances of the daws, magpies, and starlings, that attend upon our sheep and horned cattle, there are more close alliances founded on a reciprocity of benefits. Such, among the warm-blooded vertebrated animals, is the connection between the *Buphaga erythrorhyncha*—the beef-eater of the English, the *pique-bœuf* of the French—and the oxen, camels, and antelopes, which it frees from the *larvæ* that burrow in their hides, for which service its feet and beak are admirably adapted—the feet, armed with strong claws, affording a firm hold on the back of the animal, and the beak, fashioned so as to dig and extract the maggots as neatly as an instrument combining the qualities of a lancet and forceps, in skilful surgical hands, could perform the operation. Such are the rhinoceros birds mentioned by Mr. Cumming. Even among the molluscous animals we have the association of the pinna and the crab.

The rhinoceros birds were just as attentive to their charge as the guard which deprived Mr. Curzon of his "ugly game." A native had informed Mr. Cumming that a white rhinoceros was lying asleep in thick cover, and he accompanied his guide to the spot. The rhinoceros was lying asleep beneath a shady tree, and his appearance reminded Mr. Cumming of an enormous hog. The beast kept constantly flapping his ears, which, he says, rhinoceroses invariably do when sleeping. But before he could reach the proper distance to fire, several *rhinoceros birds* by which he was attended warned him of his impending danger by sticking their bills into his ear, and uttering their harsh, grating cry. Thus aroused, he suddenly sprang to his feet, crashed away through the jungle at a rapid rate, and Mr. Cumming saw him no more. But it appears that it is not to the rhinoceros alone that these guardians do good service.

* *Holland's Pliny*. † London: John Murray. 1849.

of broken rocks, where he would have been beyond my reach, but before he could gain this place of refuge I caught him two or three tremendous whacks on the head. He, however, held on, and gained a pool of muddy water, which he was rapidly crossing, when I again belabored him; and at length reduced his pace to a stand. We then hanged him by the neck to a bough of a tree, and in about fifteen minutes he seemed dead, but he again became very troublesome during the operation of skinning, twisting his body in all manner of ways. This serpent measured fourteen feet.

There is no amount of torture that man—aye, and woman too, will not inflict on an animal that does not cry out. If the eels, which the fish-wife or the cook skins with so much unconcern, could express their agonies audibly, nothing would induce either of those delicate females to continue the horrible and merciless operation; but the eels are mute, and suffer accordingly.

Two works of art, ancient and modern, rise before us; one in all the simplicity and purity of marble; the other glowing with all the enchantment of color. In the one, the agonized priest of Apollo and his hapless children vainly struggle in the folds of the serpents:—

Laocoönta petunt: et primum parva duorum
Corpora natorum serpens amplexus uterque
Implicat, et miseros morsu depascitur artus.
Post ipsum auxilio subeuntem ac tela ferentem
Corripiunt, spirisque ligant ingentibus; et jam
Bis medium amplecti, bis collo squamea circum
Terga dati superant capite et cervicibus altis.
Ille simul manibus tendit divellere nodos,
Perfusus sanie vittas atroque veneno;
Clamores simul horrendos ad sidera tollit.

In that marvellous group,

All made out of the carver's brain,

the serpents are so represented, that the spectator feels that there is no hope for the victims. The very opposite of it appears in the subject made musical by the exquisite Doric reed of Theocritus, and brought in all its grandeur before the eye by the bold and beautiful pencil of our own Reynolds.

In the idyll of the Greek,* opening with one of the most charming material scenes and good nights ever presented to the imagination, the serpents are made to relax their folds when the spines of their backs waxed weary under the killing grasp of the Infant Hercules; and in the British picture you see at once that they are dying, overcome by the vigor of the son of Jupiter.

But as long as the locomotive machinery is in good order, the sinuous, graceful windings of the serpent, joined to the bright hues with which the skin of the majority of the species is enamelled, make it a pleasing object to those who can overcome the natural antipathy felt by so many at their presence, and incline them to sympathize with the Indian girl—

Stay, stay, thou lovely, fearful snake,
Nor hide thee in yon darksome brake;
But let me oft thy form review,

* Ηρακλίσκος. Εἰδήλλιον κθ'.
Ηρακλῖα δακτύλων ἰόντα.—κ. τ. λ.

Thy sparkling eyes and golden hue;
From thence a chaplet shall be wove
To grace the youth I dearest love.
Then, ages hence, when thou no more
Shalt glide along the sunny shore,
Thy copied beauties shall be seen;
Thy vermeil red and living green
In mimic folds thou shalt display;
Stay, lovely, fearful adder stay!

To be sure, poets, as well as doctors, differ; and Coleridge, in "that singularly wild and beautiful poem," tells us that

A snake's small eye blinks dull and sly.

And dull it is sometimes, but only before moulting, for the skin of the cornea comes off with the rest of the slough. When the serpent comes out in its new coat, with its bright eye and elegant action, it is as different from its former self as Talleyrand in solitary dishabille was from Talleyrand dressed in a brilliant assembly, through whose crowded mazes he would wind his way, his very lameness lending grace to his gently undulating progress.

Those who define a serpent as an apod, or footless animal, carry their definition too far. The large constricting serpents, and not only those, but *eryx* and *tortrix*, are furnished with the rudiments of hinder extremities, which appear to have escaped the notice of Sir Everard Home, but did not escape that of Dr. Mayer. Observing the spur, or nail, on each side of the vent in the *boïda*, the doctor examined further, and found it to be a true nail, in the cavity of which is a little semi-cartilaginous bone, unguis phalanx, articulated with another much better developed bone, which is concealed under the skin. This second bone of the rudimentary foot presented an external thick condyle, with which the unguis phalanx was articulated, and was furnished besides with a smaller internal apophysis. Proceeding in his investigation, he laid bare a rudimentary tibia with its muscles, and made out a complete posterior limb, such as it was, the foot being furnished with its abductor and adductor muscles. Upon these elements he founded his *Phanopoda*, a family of Ophidians, having the rudiments of a foot visible externally, containing the genera *boa*, *python*, *eryx*, and *tortrix*.

The author of the article "Boa," in the *Penny Cyclopædia*, where the details of this curious discovery are given, observes, that no one can read of the habits of these reptiles in a state of nature without perceiving the advantage which they gain, when, holding on by their tails on a tree, their heads and bodies in ambush, and half-floating on some sedgy river, they surprise the thirsty animal that seeks the stream. These hooks help the serpent to maintain a fixed point; they become a fulcrum, which gives a double power to his energies.

We need not go to the Valley of Diamonds with Sinbad to find enormous serpents. The companions of other sailors have been swallowed up by those monstrous reptiles, as was too clearly proved to the crew of the Malay proa, who an-

in one hole: the others were imprisoned singly, and the holes were tightly plugged up. The result of these experiments was, a conclusion that toads cannot live a year excluded totally from atmospheric air, and that they cannot survive two years, if entirely prevented from obtaining food.

But let us, before we depart, look into the reptile-house on a warm summer night. We enter with a dark lanthorn. The light is no sooner unveiled, than it seems to have a Promethean effect on the statue-like forms that were so still in the morning. Now the scene is changed; now all is action, terrible action; and we behold the monstrous constricting serpents, and the horrible poisonous snakes, and the uncouth lizards, writhing, coiling, creeping, running, and pushing against the transparent walls of their crystal prison, till the nervous anxiety of some temperaments may be pardoned for huddling up to the keeper, and inquiring, with bated breath, whether the glass is python and boa-constrictor proof?

March 27.—The rain it raineth every day. The peck of dust, worth a king's ransom, will hardly be forthcoming, and the farmer begins to be uneasy about his oats. The garden in the Regent's Park is a swamp. Both the great and smaller tortoise in the ostrich-house are dead, as I feared. A small one that buries itself two or three feet deep in the earth, exposed to all the skyey influences, does well. Hippo is flourishing, and now has clover-chaff tea, with the boiled chaff as a change of diet. He drinks the tea, and then eats the sop. His tank in the open air is advancing rapidly towards completion. The beautiful crested pigeons,* with their hybrid young one, are in fine condition. On the 8th September, in the last year, I found Goura Victorie on her nest, with her young one able to fly. On that day it was five weeks old. The male bird, Goura coronata, better known as "the great Amboyna pigeon," which belongs to her majesty, was strutting about on the ground. His productive alliance with the species which bears our gracious queen's name, is worthy of notice, particularly when the difference of climate is taken into the account. The egg—there was only one—from which the hybrid sprung, was sat on twenty-eight days before the young bird was hatched, by both parents; but the male was most assiduous and the best nurse.

An egg was laid and hatched in 1849, but the young one died a day or two after its exclusion. The birds showing a disposition to sit in 1850, the cover of a basket was placed upon the angle of a stout, forked pole, in the great aviary; and a few birch twigs furnished to them. Out of these rough materials they made a nest. They sat side by side. The male always sat with his head fronting the spectator, or nearly so, as if he was keeping watch, and the female with hers exactly in the opposite direction, so that the head of the cock was parallel to the tail of the hen. The

young one was fed from the crops and mouths of both parents.

And here we cannot but feel with John Hunter, who discovered the curious organization in the dove kind, which enables the parents to support their young with the curd-like contents of their crops—from their own bodies, in short, as the mammalia do in the early stages of the existence of their offspring—that the nourishment of animals admits, perhaps, of as much variety in the mode by which it is to be performed, as any circumstance connected with their economy, whether we consider their numerous tribes, the different stages through which every animal passes, or the food adapted to each in their distinct conditions and situations. The food fitted for one stage of life is rejected at another.

Animal life (as Hunter observes) may be divided into three states, or stages: the first comprehending the production of the animal and its growth in the fetal state; the second commencing when it emerges from that state by what is called the birth, but leaving it for a time, either mediate or immediately dependent on the parent for support; the third when the animal is able to act for itself. As a general proposition, it may be laid down that the first and third stages are common to all animals; but some classes—fishes and spiders, for instance—pass directly from the first to the third, having no intermediate stage.

The great physiologist then notices the infinite variety in which Nature provides for the support of the young in the second stage of animal life, and that brings him to the statement of his discovery. He tells us, and tells us truly, that the young pigeon, like the young quadruped, till it is capable of digesting the common food of its kind, is fed with a substance secreted for that purpose by the parent; not, as in the mammalia, by the female alone, but by the male also, and perhaps more abundantly than by the female.

Every person who has kept parrots, maccaws, and birds generally of that family, must have noticed the power possessed by them of throwing up the contents of the crop, and feeding each other. Hunter, in common with others, saw a cock paroquet regularly feed his hen, by first filling his own crop, and supplying her thence from his beak; and he notices what every observer who has kept such birds must have remarked—namely, that when they are very fond of the person who feeds and attends upon them, they perform the action of throwing up food, and often do it. The cock pigeon, when he caresses the hen, goes through the same forms of action as when he feeds his young; but Hunter adds, that he does not know if at this time he throws up anything from the crop. I have observed a similar action, during the breeding season in rooks; and I have reason to believe that the cocks feed the hens while they are sitting, as well as the young, with food saved in a kind of gular pouch under the lower mandible, but I do not know whether they feed either the hens or the young with food so

* *Goura coronata* and *Goura Victorie*.

has undergone any alteration in the crop, or whether the hens feed their young or their mates with such provender. Hunter, from the observations made by him on the parrot-kind, states that he has reason to suppose that they are endowed with the same power as the pigeons.

As the breasts or udders of mammiferous females become gradually enlarged and thickened at the time of uterine gestation, so, during incubation, are the coats of the pigeon's crop; and John Hunter, on comparing the state of that organ when the bird was not sitting, with its appearance during incubation, found the difference very remarkable. In the first case, it was thin and membranous; but by the time when the young were about to be hatched, the whole, except the portion which lay under the trachea, became thicker, and assumed a glandular appearance, having its internal surface very irregular. It was likewise evidently more vascular than in its former state, in order to the conveyance of a quantity of blood sufficient for the nourishing substance.

Whatever may be the consistence of this substance when just secreted, it most probably very soon coagulates into a granulated white curd, for in such form," says Hunter, in continuation, "I have always found it in the crop; and if an old pigeon is killed just as the young ones are hatching, the crop will be found as above described, and in its cavity pieces of white curd, mixed with some of the common food of the pigeon, such as barley, beans, &c. If we allow either of the parents to feed the brood, the crop of the young pigeons when examined will be discovered to contain the same kind of curdled substance as that of the old ones, which passes from thence into the stomach, where it is to be digested."

The joke about "pigeon's milk" is not so groundless, after all. But see how beautifully this dispensation is ordered, according to the exigencies of the nestling:—

The young pigeon is fed for a little time with this substance only, as about the third day some of the common food is found mingled with it; as the pigeon grows older, the proportion of common food is increased; so that by the time it is seven, eight, or nine days old, the secretion of the curd ceases in the old ones, and of course no more will be found in the crop of the young. It is a curious fact, that the parent pigeon has at first a power to throw up his curd without any mixture of common food, although, afterwards, both are thrown up, according to the proportion required for the young ones.

I have called this substance curd, not as being literally so, but as resembling that more than anything I know; it may, however, have a greater resemblance to curd than we are perhaps aware of, for neither this secretion, nor curd from which the whey has been pressed, seems to contain any sugar, and do not run into the acetous fermentation. The property of coagulating is confined to the substance itself, as it produces no such effect when mixed with milk. This secretion in the pigeon, like all other animal substances, becomes putrid by stand-

it-resisting putrefaction for a considerable time; neither will curd much pressed become putrid so soon as either blood or meat.*

Those who would wish to examine this phenomenon more closely will find preparations of the pigeon's crop in that noble museum,† which is John Hunter's best monument. No young birds are in so forlorn a state as young pigeons, if the parents are killed before the young can provide for themselves. Birds of other species, stimulated by the cries of the starving young which have been deprived of parental aid, can and do assist the little wretches, but none except an old pigeon with its crop in a proper state can save the life of a nestling dove.

The gouras, by whose alliance a third columban form of the same race has been ushered into this breathing world of ours, in their natural state, are probably employed, like others of the dove kind, in disseminating the fragrant nutmegs through New Guinea, the Moluccas, and other islands. For Sonnerat declares, and with truth, that the pigeons which swallow the nuts whole are nourished by the enveloping case, which is alone digested, leaving the nut itself uninjured, or rather more readily prepared for germinating on the soil whereon it is dropped.‡

The Zoological Society possesses a very fine collection of *Columbidae*, and a most interesting tribe they are. Messengers of love, of peace, and of war, they are allied very nearly, as we have seen above, to the *mammalia* in one part of their organization, and resemble them in some of their habits; for pigeons do not drink like most birds by taking up a small quantity of water at a time, and throwing the head upward and backward, but, like horses or kine, suck up a long continuous draught without raising the head, till thirst is satisfied.

Columba: whence the name? Varro declares from its cooing. Did the same impression of its notes on the ancient British ear call forth a similar appellation, and induce our ancestors to name the birds colommen, kylobman, kulm, kolm, and culver?

The perseverance with which some of the varieties, the carriers especially, when well trained, will return from very long distances, is wonderful:—

It blew and it rained,
The pigeon disdained
To seek shelter—undaunted he flew;
Till wet was his wing,
And painful the string,
So heavy the letter it grew.

This same faculty, which in comparatively modern times was degraded to giving notice to the

* *Animal Economy*, edited by Professor Owen. Longman and Co.

† The museum of the Royal College of Surgeons of England, rendered doubly valuable by the learned and elaborate Catalogue by Professor Owen, in 6 vols. 4to. The preparations are numbered 3737 to 3741, both inclusive.

— either blood or meat,

ZOOLOGICAL

R E C R E A T I O N S.

BY

W. J. BRODERIP, ESQ., F.R.S.

&c. &c.

"He prayeth best, who loveth best
All things both great and small;
For the dear God who loveth us,
He made and loveth all."

COLERIDGE.

LONDON:

HENRY COLBURN, PUBLISHER,

GREAT MARLBOROUGH STREET.

1847.

Let us endeavour, before we proceed further, to give the reader some idea of the natural musical instrument with which the loud and complicated passages of song-birds are executed. The *larynx* is formed much after the fashion of some artificial wind-instruments, and consists of two parts; of these the first contains the proper *rima glottidis*, at the upper end, while the bronchial, or lower *larynx*, is furnished with another *rima glottidis* with tense membranes. The lower apparatus may be compared to the reed in a clarionet or hautboy, and the upper to the ventage or hole of the instrument that utters the note. Besides all this, it has been truly asserted that there is no part of a bird's structure impervious to air; and, as M. Jacquemin observes, it is the volume of air which birds can introduce into their bodies, and the force with which they can expel it, that solve the problem how so small a creature as a singing bird can be capable of sending forth notes so loud and of warbling so long and so prodigally without apparent fatigue. The muscles, whose province it is to regulate this wonderful wind-instrument, are proportionably strong and highly developed in the sex which is more peculiarly gifted with musical power. Thus John Hunter, on dissecting a cock-nightingale, a cock and hen blackbird, a cock linnet, and a cock and hen chaffinch, found the muscles of the *larynx* to be stronger in the nightingale than in any other bird of the same size; and in all the instances where he dissected both cock and hen, he remarked that the same muscles were stronger in the cock. The rivalry with which some of these feathered songsters will sing against each other in captivity is well known to bird-fanciers, and Bechstein observes, speaking of the Thuringian Canary birds, that there are some males which, especially in the pairing season, sing with so much strength and ardour, that they burst the delicate vessels of the lungs and die suddenly.

The Hon. Daines Barrington, who paid much attention to this subject, remarks that some passages of the song in a few kinds of birds correspond with the intervals of our musical scale; but that much the greater part of such a song is not capable of musical notations. He attributes this to the following causes:—First, because the rapidity is often so great, and it is also so uncertain where they may stop, that it is impossible to reduce the passages to form a musical bar in any time whatsoever;—secondly, on account of the pitch of most birds being considerably higher than the most shrill notes of instruments of the greatest compass;—and lastly, because the intervals used by birds are commonly so minute that we cannot judge at all of them from the more gross intervals into which our musical octave is divided.

But though, as the same author observes, we cannot attain the

more delicate and imperceptible intervals in the song of birds, yet many of them are capable of whistling tunes with our more gross intervals, as in the case of piping bullfinches and canary-birds. This faculty of learning the first notes that the bird is able to distinguish, leads us to another interesting part of our subject, and we will now proceed to the experiments made by Daines

Barrington, showing that the varied songs which distinguish different species of birds, are the consequence of the parental notes which first meet their ears.

The learned author states that to be certain that a nestling will not have even the *call* of its species, it should be taken from the nest when only a day or two old; because, though nestlings cannot see till the seventh day, yet they can hear from the instant they are hatched, and probably, from that circumstance, attend to sounds more than they do afterwards, especially as the call of the parents announces the arrival of their food. After stating the trouble of breeding up a bird of this tender age, and admitting that he himself never reared one, he goes on to speak of a linnet and a goldfinch which he had seen, and which were taken from their nests when only two or three days old, and to mention some other curious instances of imitation in the following terms:—

"The first of these (the linnet) belonged to Mr. Matthews, an apothecary at Kensington, which, from a want of other sounds to imitate, almost articulated the words *pretty boy*, as well as some other short sentences. I heard the bird myself repeat the words *pretty boy*; and Mr. Matthews assured me, that he had neither the note nor call of any bird whatsoever. This talking linnet died last year, before which many people went from London to hear him speak."

"The goldfinch I have before mentioned was reared in the town of Knighton, in Radnorshire, which I happened to hear as I was walking by the house where it was kept. I thought, indeed, that a wren was singing; and I went into the house to inquire after it, as that little bird seldom lives long in a cage. The people of the house, however, told me that they had no bird but a goldfinch, which they conceived to sing its own natural note as they called it; upon which I stayed a considerable time in the room, whilst its notes were merely those of a wren, without the least mixture of goldfinch. On further inquiries, I found that the bird had been taken from the nest when only a day or two old, that it was hung in a window which was opposite to a small garden, whence the nestling had undoubtedly acquired the notes of the wren, without having had any opportunity of learning even the *call* of a goldfinch. These facts which I have stated, seem to prove very deci-

sively that birds have not any innate ideas of the notes which are supposed to be peculiar to each species. But it will possibly be asked, why, in a wild state, they adhere so steadily to the same song, inasmuch that it is well known, before the bird is heard, what notes you are to expect from him? This, however, arises entirely from the nestling's attending only to the instruction of the parent bird, whilst it disregards the notes of all others, which may, perhaps, be singing around him. Young *Canary* birds are frequently reared in a room where there are many other sorts, and yet I have been informed that they only learn the song of the parent cock. Every one knows that the common house-sparrow, when in a wild state, never does anything but chirp; this does not, however, arise from want of power in this bird to imitate others, but because he only attends to the parental note."

Two points in this interesting description will be noted by the observer, and the questions will occur—how was the first bird of each species taught, and is not the assertion touching the sparrow

some what bold?

The difficulty surrounding the first is more apparent than real; for, if it be granted that species were created, all the distinctions of voice and plumage follow of course; and it will equally follow that they have been regularly transmitted down to the present period in such species as have not become extinct. With regard to the second we shall permit Mr. Barrington to speak for himself, for he has proved the fact:—

"To prove this decisively, I took a common sparrow from the nest when it was fledged and educated him under a linnet; the bird, however, by accident heard a goldfinch also, and his song was, therefore, a mixture of the linnet and goldfinch."

The same experimentalist educated a young robin, under a very fine nightingale, which, however, began already to be out of song, and was perfectly mute in less than a fortnight: the scholar afterwards sang three parts in four nightingale, and the rest of his song was what the bird-catchers call "rubbish," or no particular note whatever.

Bechstein observes that nearly all birds when young will learn some strain whistled or played to them every day; but those only whose memory is retentive will abandon their natural song and adopt fluently the air that has been taught them. In proof of this position, he adduces the cases of the goldfinch and bullfinch,

stating that a young goldfinch will, indeed, learn some part of the melody played to a bullfinch, but will never repeat the lesson so perfectly as the latter, and that this difference is not caused by the greater or less flexibility of the organ of the voice, but rather by the superiority of the bullfinch's memory.

In the cultivation and management of the human voice, and to keep up its tone, and the power of execution, we know how necessary constant practice is; and we find the same sort of discipline resorted to both by caged birds, and those which pour forth their "wood notes wild."

"It is remarkable," says Bechstein, "that birds which do not sing all the year, such as the redbreast, siskin, and goldfinch, seem obliged, after moulting, to learn to warble, as though they had forgotten; but I have seen enough to convince me that these attempts are merely to render the *larynx* pliant, and are a kind of chirping, the notes of which have but little relation to the proper song; for a slight attention will discover that the *larynx* becomes gradually capable of giving the common warble. This method of recovering the song does not, then, show deficiency of memory, but liability to rigidity, occasioned by disuse of the *larynx*. The chaffinch will exercise itself in this way some weeks before it

attains its former proficiency, and the nightingale practises as long the strains of his beautiful song, before he gives it full, clear, and in all its extent."

This "practising" is termed by our British bird-fanciers and bird-catchers, "recording," a word, according to Daines Barrington, probably derived from the musical instrument formerly used in England, called a "recorder,"* which seems to have been a species of flute, and was probably used to teach young birds to pipe notes. The term "recording" is more particularly used by the same fraternity, to distinguish the attempt of the nestling to sing, and which may be compared to the babble of a child in its imperfect endeavours to articulate.

"I have known," says Barrington, "instances of birds beginning to record when they were not a month old. This first essay does not seem to have the least rudiments of the future song; but as the bird grows older and stronger, one may begin to perceive what the nestling is aiming at. Whilst the scholar is thus endeavouring to form his song, when he is once sure of a passage, he commonly raises his tone, which he drops again when he is not equal to what he is attempting; just as a singer raises his voice, when he not only recollects certain parts of a tune with precision, but knows that he can execute them. What the nestling is not thus thoroughly master of, he hurries over, lowering his tone, as if he did not wish to be heard, and could not yet satisfy himself. A young bird commonly continues to record for ten or eleven months, when he is able to execute every part of his song.

* The passage in "Hamlet" will occur to every one.

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which afterwards continues fixed, and is scarcely ever altered. When the bird is thus become perfect in his lesson, he is said to sing his song round, or in all its varieties of passages, which he connects together, and executes without a pause."

Barrington defines a bird's song to be a succession of three or more different notes, which are continued without interruption during the same interval with a musical bar of four crotchets in an *adagio* movement, or whilst a pendulum swings four seconds. Now let us see what notes have been detected in the song. Observers have marked *F* natural in woodlarks; *A* in thrushes; *c* falling to *A* commonly in the cuckoo; *A* natural in common cocks; *B* flat in a very large cock; *D* in some owls; *B* flat in others. Thus we have *A*, *B* flat, *C*, *D*, and *F*, to which Barrington adds *G* from his own observations on a nightingale which lived three years in a cage; and he confirms the remarks of the observer who furnished him with the list, and says he has frequently heard from the same bird *C* and *F*. To prove the precision of the pitch of these notes, the *B* flat of the spinnet by which he tried them was perfectly in tune with the great bell of St. Paul's. *E* then is the only note wanting to complete the scale; but, as he says, the six other notes afford sufficient data for making some conjectures with regard to the key in which birds may be supposed to sing, as these intervals can only be found in the key of *F* with a sharp third, or that of *G* with a flat third; and he supposed it to be the plaintive flat third, that affecting tone which, in the simple ballad, or "wild and sad" chorus, so comes home to our bosoms.

"Oft have I listened, and stood still,
As it came softened up the hill,
And deemed it the lament of men,
Who languished for their native glen."

Barrington pronounces in favour of the flat third, because he agrees with Lucretius, that man first learnt musical notes from birds, and because the cuckoo, whose "plain song" has been most attended to, performs it in a flat third. He strengthens his argument by showing that most of our simple compositions—old melodies such as "Morva Rhydlund," and ancient music generally

have an almost miraculous power over the race, as the bird-catcher well knows.

"When the bird-catcher hath laid his nets, he disposes of his *call-birds* at proper intervals. It must be owned that there is a most malicious joy in these *call-birds* to bring the wild ones into the same captivity, which may likewise be observed with regard to the decoy ducks. Their sight and hearing infinitely excel that of the bird-catcher. The instant that the wild birds are perceived, notice is given by one to the rest of the *call-birds*, (as it is by the first hound that hits on the scent, to the rest of the pack,) after which follows the same sort of tumultuous ecstasy and joy. The *call-birds*, while the bird is at a distance, do not sing as a bird does in a chamber; they invite the wild ones by what the bird-catchers call *short jerks*, which, when the birds are good, may be heard at a great distance. The ascendancy by this call, or invitation, is so great, that the wild bird is stopped in its course of flight, and if not already acquainted with the nets, lights boldly within twenty yards of perhaps three or four bird-catchers, on a spot which otherwise it would not have taken the least notice of. Nay, it frequently happens that, if half a flock only are caught, the remaining half will immediately afterwards light in the nets, and share the same fate; and should only one bird escape, that

—are almost always in a flat third. The music of the Turks and Chinese, he also adduces as having half of the airs in a minor third which is "adapted to simple movements such as may be expected in countries where music hath not been long cultivated."

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The wild fowl, in their lofty aerial flights, keep up a constant watch-note of communication with each other; and far and wide

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in the silence of night does their cry resound. The windpipes of many of these are complete wind instruments; that of the wild swan takes a turn within the sternum somewhat after the fashion of a French horn or bugle. May not these unearthly sounds, heard from on high,

"At the lone midnight hour, when bad spirits have power,"

have assisted the legends of the ghostly huntsman, and his wild chase in the air, sweeping overhead like the rush of withered leaves?

The *call*, as it is technically termed, of singing birds seems to

bird will suffer itself to be pulled at till it is caught—such a fascinating power have the *call-birds*.*

We do not mean to detain the reader upon a bird-catching expedition—though it would be more full of interest than some would think—but he ought to know, before he goes on one, that a bird acquainted with the nets is by the bird-catchers termed a *sharper*; him they endeavour to drive away, as they can have no sport in his company. It is worthy of note, too, that even in their captivity the natural instinct of the *call-birds* is in many points no whit blunted; for the moment they see a hawk, caged though

* Barrington on the small birds of flight.

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they be, they communicate the alarm to each other, by a plaintive note, nor will they then *jerk* or *call*, though the wild birds are near.*

It is in the *Insectorial* order† of birds that the songsters abound, but there is one remarkable exception among the Raptorial order, in that warbling African, *Le Faucon Chanteur*‡ of Le Vaillant, perhaps the only known bird of prey—Cuvier says the only known one—that sings agreeably. Its song is very sweet, but dangerous as the lay of the *Syrens*, and

“Mocks the dead bones that lie scattered by.”

Few spots are more musical with song-birds than these islands. Not that the woods of America are mute—but they want the brilliant variety of ours; and one of her sons, who has so well deserved of the lovers of natural history in all countries, has endeavoured to colonize the Transatlantic groves with the feathered songsters of Britain. And yet they have that wonderful polyglot the mock-bird.§ Him we have seen and heard in captivity, and—but Wilson has immortalized the bird with his graphic pen, and, in all humility, we lay down ours.

* Barrington on the small birds of flight.

‡ *Falco musicus* of Daudin.

† *Insectores*—Perching birds.

§ *Orpheus polyglottus*.

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The notes of the Gold-crested Wren*, the smallest of British birds, can hardly be called a song, but they salute the ear in the beginning of February, and the beautiful little bird, with its elegant nest and pale-brown eggs, weighing nine or ten grains each—the bird weighs no more than eighty—must not pass unnoticed. A pair, which took possession of a fir-tree in Colonel Montagu's garden, ceased their song as soon as the young were hatched; and, when they were about six days old, he took the nest and placed it outside his study window. After the old birds had become familiar with that situation, the basket was brought within the window, and, afterwards, was conveyed to the opposite side of the room. The male had regularly assisted in feeding the young ones as long as they remained outside the window; and, though he attended the female afterwards to that barrier, he never once entered the room, nor brought any food while the young were in it. But the mother's affections were not to be so checked:—she would enter, and feed her infant brood at the table where Colonel Montagu was sitting, and even while he held the nest in his hand. One day he moved his head as she was sitting on the edge of the nest which he held. She instantly retreated—so precipitately, that she mistook the closed for the open part of the window, dashed herself against the glass, and lay apparently breathless on the floor for some time.

Neither the fright nor the hurt could, however, overpower her maternal yearnings. Colonel Montagu had the pleasure of seeing her recover, and soon return, and she afterwards frequently fed

We cannot quit this family without adverting to a charge made against some of the species—abandonment of their young. This has been proved against the swallow and the martin; and the swift has been suspected, whether justly or not we shall presently inquire.

There is no doubt that late broods of swallows have been left by their vagrant parents to perish in their nests by the most distressing of deaths; and as little that the martins are guilty of the same desertion. Dr. Jenner has recorded the fact against a pair of martins which hatched four broods in one year: the last hapless brood came into existence early in October, and about the middle of the month the old birds went off, and left their nestlings, then about half-fledged, to die. They returned to the nest on the 17th of May, in the next year, and threw the skeletons out. Mr. Blackwall* has put the frequent occurrence of this unparental act beyond doubt. Among many other evidences, he has seen a pair of house-martins, after taking possession of an old nest, draw out the dried bodies of three nearly full-fledged nestlings, before they established themselves therein. About the same time, and near the same place, another pair endeavoured to get rid of the dead bodies of the victims; their efforts to dislodge the carcasses

her nestlings while he held the nest in his hand. The little mother's visits were generally repeated in the space of a minute and a half, or two minutes, or, upon an average, thirty-six times in an hour; and this continued for full sixteen hours in a day, which would amount to seventy-two feeds daily for each, if equally divided between the eight young ones, amounting in the whole to five hundred and seventy-six. “From examination of the food,” says the Colonel, “which by accident now and then dropped into the nest, I judged, from those weighed, that each feed was a quarter of a grain upon an average, so that each young one was supplied with eighteen grains weight in a day; and, as the young birds weighed about seventy-seven grains when they began to perch, they consumed nearly their weight of food in four days at that time. I could always perceive by the animation of the brood when the old one was coming; probably some low note indicated

* *Regulus cristatus*. There are two species, viz., *Regulus aurocapillus* (Gold-crested *Regulus*), and *Regulus ignicapillus* (Fire-crested *Regulus*).

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her approach, and, in an instant, every mouth was open to receive the insect morsel.”

were ineffectual, and they then closed up the aperture of the nest with clay, thus converting it into a sepulchre. At first Mr. Blackwall was disposed to attribute the untimely death of the nestlings to the accidental destruction of one or both parents; but the accumulated evidence forbade any other conclusion than that these cases of protracted suffering and ultimate dissolution, were the result of voluntary abandonment. May not the praises bestowed of old upon the swallow for its piety in burying its dead, have taken their origin from some such facts as one of those recorded by Mr. Blackwall?

* Researches in Zoology.

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Richard's-pipit (*Anthus Ricardi*) was first noticed by Mr. Vigors, as an occasional visiter, and though the appearance of others here has been recorded, they can only be considered as stragglers.

Of the true larks (*Alaudidæ*), the only visiter, and that accidentally, is the shore-lark (*Alauda alpestris*). Its range from north to south is great. Captain Sir James Ross, R.N., records one shot near Felix Harbour, and Captain Phillip Parker King brought it from the Straits of Magellan; or, more correctly, Magalhaens. The bird is a sweet singer, and Audubon, who found it

“— on the dismal shore
Of cold and pitiless Labrador;
Where under the moon, upon mounts of frost
Full many a mariner's bones are tost,”

graphically describes its zealous parental affection.

“Although in the course of our previous rambles along the coast of Labrador,” says that eloquent and accurate ornithologist, “and among the numberless islands that guard its shores, I had already seen this lark while breeding, never before that day did I so much enjoy its song, and never before I reached this singular spot had I to add to my pleasures that of finding its nest. Here I found the bird in the full perfection of plumage and song, and here I had an opportunity of studying its habits, which I will now endeavour to describe.

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Nor did the cuckoo fail to figure in the ancient pharmacopeia. Pliny tells us,* that if it be wrapped in a hare-skin and applied to the patient, it will produce sleep, and Rodeletius notices its ashes as good against disorders of the stomach. A somewhat unsavoury decoction, into the ingredients of which we will not now enter, but which could be procured only from the cuckoo, was held to be a specific against the bite of a mad dog; and, according to the Roman zoologist, the very sound of its voice, when assisted by due ceremonies, produced a degree of domestic comfort, which, if the ancient Italians were as much subject to pulicial persecution as the moderns, must have been quite invaluable: that they were not spared the company of the indefatigable insect voltigeurs, any more than their descendants, is rendered highly probable by their lack of linen. If, when the bird was first heard, the auditor circumscribed his right-foot, and dug up the earth on which it rested, not a flea would be hatched wherever that earth was scattered.† Nor did the ancient kitchens disdain it. On the contrary, Aristotle states, that cuckoos are fattest and most highly-flavoured about the time of their laying;‡ and Pliny declares that no bird can compete with a young cuckoo, just able to fly, in the sweetness of its flesh.|| Aldrovandus remarks, that the Italians still bring it to their tables; but that the Germans reject it with loathing as an unclean bird, on account of its habit of spitting, to the consideration of which charge we now proceed.

The country people and their children still give the name of “cuckoo-spittle” to the frothy nidus of *Tettigonia spumaria*, which

them, they must turn the head entirely, and thus bring the whole concentrating apparatus to bear upon the object. In the accipitrine or less typical owls,—the hawk-owl, *Surnia funerea*, for example, which frequently hunts by day—the head is smaller, and the facial disk less perfect, so that the bird is better able to bear a strong light.

The sense of hearing is most acute. The wide and moderately deep outward meatus is guarded by an internal fold of skin, and provided with a well-developed auricular circle of feathers which, together, well officiate as an external *concha* to catch and convey the slightest sound. The rustling of a straw, a dead leaf, or withered herbage, may betray the “timorous beastie” that runs below. With all this, the plumage is of the softest texture, and is so contrived, that the action of flying shall not interfere with the perfect effect of the auditory machinery, or operate as a warning to the prey. The external edge of the primary quill-feathers is serrated, so that less resistance is offered, and the flight is performed noiselessly, in strong contrast with the whirring-wing of the partridge, whose heavy body is borne off with a startling sound that brings the heart of the inexperienced sportsman into his mouth, and often saves the game. Both bone and muscle are

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every one almost must have observed on plants in the spring. The worst that now comes of this fable now is, that when the children surround a plant so embossed, one older and more learned than the rest will clear away the froth to show the admiring minors the inmate, gravely assuring them that it will be a cuckoo! But, no very long time ago, this “cuckoo-spittle” had a very bad name, and constituted under the name of “witches-butter,” one of the proofs, as the sages of the church and the law then pronounced such absurdities to be, that consigned numbers of women and children to the last penalties of the law at Mohra, in Sweden, in the year 1670.

[OWLS]

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The cornea is placed at the end of this tube, and so is carried out beyond the feathers of the facial disk and head, whilst the whole machinery can be adjusted at the volition of the animal with greater nicety than that of any optical instrument made by human hands, according to the quantity of light present, or the focus required. In the typical owls, the eyes are set so completely in front, that in order to see any thing at their side or a little behind

kept down to the lowest point in the owl to make it as light as possible; and thus framed and feathered, the bird

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We must now take leave of Europe for the present, and beg our readers to change the scene to America.

"Dissection," says Mr. Yarrell, "which proved the distinction between the hooper and Bewick's swan, has also proved that the

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true wild swans of North America are peculiar to that country, and distinct from the two European swans.

4. Of the American swans, the largest—it is larger than our hooper—is the Trumpeter Swan, or Hunter's Swan, *Cygnus buccinator*, the *Keetchee wapeeshew* of the Cree Indians.

Lawson in his "Natural History of Carolina" (1714), says:

"Of the swans we have two sorts; the one we call *Trompeters*, because of a sort of trompeting noise they make. These are the largest sort we have, which come in great flocks in the winter, and stay commonly in the fresh rivers till February, that the spring comes on, when they go to the lakes to breed. A cygnet, that is, a last year's swan, is accounted a delicate dish, as indeed it is. They are known by their head and feathers, which are not so white as old birds."

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In the dogs properly so called, the pupil of the eye is round; this modification of the organization exists in the wolf and the jackal, and for this reason the African Fennec or Zerda is now associated with the true dogs; but the pupil of the eye in the foxes, whose habits are more nocturnal, is vertical. The wild dogs, as they are called—and we do not mean to say that they are improperly named—in whatever quarter of the world they are found, do not, in our opinion, help the question; indeed they have embarrassed it. Now there is evidence of the existence of the domesticated dog from the earliest times, and we see no sound reason for concluding that these wild races, some of which are well known to our Indian friends, and one of which has been named somewhat boldly, *canis primævus*, do not owe their origin to dogs which have been once under the subjection of man, partially at least, and have from circumstances taken to roving habits and a natural state like the wild horses of America.

In pursuing this inquiry, it becomes of importance to ascertain in which of the supposed stocks we can trace the seeds of that affection for man,—yes, *affection* is the word,—that so highly distinguishes the dog. The jackal is altogether unamiable, and we know from the experiments of John Hunter, that though it will breed with the dog, the period of gestation is fifty-nine days. If the fox is looked to—we say nothing of an appeal to another of the senses—there does not appear any very inviting symptom to encourage us to make a fireside companion of him,

"Who ne'er so tame, so cherish'd and lock'd up,
Will have a wild trick of his ancestors."

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[ELEPHANT]

This wonderful organ—almost equal to the hand of man, superior to that of the apes—is, perhaps, the most elaborate piece of mechanism as yet known to us. In consequence of the space necessarily occupied by the sockets of the tusks, the nasal bones are limited in their development; and the nostrils in the skeleton are situated towards the upper part of the face. But in the living animal they are prolonged into a cylindrical proboscis,

the ground, his tooth-brush—we have seen one rub his teeth with mud dentifrice by its aid—and his all-powerful arm. Such is this wonderful concentration of might and skill, capable of the most tremendous exertion, and the most delicate adjustment, now dashing a strong living man against a wall, from which he falls a mashed and blood-stained inanimate mass, at the behest of an eastern tyrant, and anon gathering up the comforts granted as the terrible brute's reward.

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One belonging to a vizier of Oude was twelve feet two inches high when his head was raised, as he marched in state, and measured ten feet six inches from the ground to the top of the shoulder. This was the only instance known to Mr. Corse, who was indefatigable in collecting accurate information on the subject, of an elephant exceeding ten feet in height. He had indeed some trouble in getting at the truth of rumours spread abroad by those who had seen the animal, relative to the ultra-gigantic proportions of one at Dacca belonging to the nabob, and said to be about fourteen feet high.

endowed with exquisite sensibility, the utmost facility of motion, and enormous strength. At its distal extremity is a small muscular appendage, which has aptly been termed the finger. Between thirty and forty thousand muscles, enable the elephant to extend this animated instrument, shorten it, and bend it in every direction, so that there is hardly any curve or position which it cannot assume at the will of the animal, nor any substance, large or small, with which it cannot grapple. One of the most philosophical poets of ancient Rome uses the term "angulimanus," or "snake-hand," to designate an elephant; and her greatest orator terms the proboscis "the elephant's hand." Even the rude Caffre, when he has slain one of these huge beasts, is said to amputate the trunk with a feeling of awe, and, as he solemnly buries it, to exclaim, "The elephant is a great lord, and the trunk is his hand."

But this is not all. The proboscis is the elephant's pump, his drinking-cup, his water reservoir, his *jet d'eau*—from whose fountain he besprinkles his broad back and ample body—his powdering apparatus, wherewith he puffs the collected dust over his moistened hide to protect it from flies, his foraging instrument, with which he collects his food, from the enormous leafy branch torn from the lofty tree, to the stalk of grass, or the barleycorn picked up from

ELEMENTARY COURSE
OF
NATURAL HISTORY,

BEING AN INTRODUCTION TO

ZOOLOGY:

INTENDED FOR

THE COLLEGE AND THE PARLOR.

ELEMENTS OF ORNITHOLOGY:

BY

CHARLES BROOKS.

BOSTON:

JAMES MUNROE & CO. 134 WASHINGTON STREET.

NEW YORK: C. S. FRANCIS & CO.

1847.

FEATHERS.

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Considerable differences in the form of wings arise from the various lengths of the feathers, and these are accompanied by corresponding variations in the style of flight. If the first or second feather of the primaries be the longest in the wing, (and when the second is longest the first comes underneath and supports it,) then the bird can turn in the air with greater ease than with any other form of wing.

The power of flight in birds depends upon two circumstances; first, the form and spread of the wings; and secondly, the amount of muscular energy applied to their motion.



Fig. 45. Wing of a Falcon.

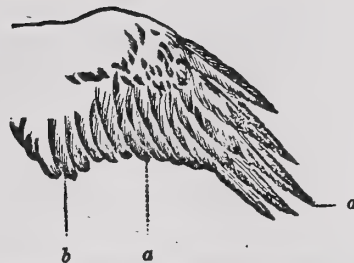


Fig. 46. Wing of a Sparrow-Hawk.

By comparing the wings of the Falcon and the Sparrow-Hawk, we can see the difference in those birds which are commonly supposed to be alike. In the wing of the Falcon, *a* indicates the quills of the hand; *bb*, those of the fore-arm, and *d*, those of the thumb. In the wing of the Hawk, *aa* indicates the quills of the hand, and *b*, those of the fore-arm. Of these two wings, that of the Falcon is much the best-contrived for strong and rapid flight; and this advantage is owing to the length of the quills of the hand, the second of which is the longest.

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With many birds the third and fourth are the longest; but with the Falcon the first quill is almost as long as the second, and this arrangement makes the wing longer and more pointed, which form is the perfection of mechanism for powerful flight; and these birds are the sharpest pursuers.

As a general rule, the longer the wings the stronger the flight. Among the swiftest birds are the Frigates, Falcons, Condors, and Swallows; but, one author thinks the Pratincole is the swiftest of all birds, and asserts, that if he could sustain his utmost speed for one week, he would fly round the earth, following the equator! The Condor and Albatros have the largest wings, being from ten to twelve feet spread.

Tail-feathers. These help to guide the bird in its flight, particularly the upward and downward movements, and also to aid him in alighting. The bones of the tail are short and generally nine in number, (v. fig. 3,) and they hold a range of strong feathers, which are variously shaped, as any one may see by comparing together the Bird of Paradise, the Wren, and the Peacock.

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MOULTING. As feathers are produced in birds by the organs which produce hair in the mammalia, so, like higher animals, the birds shed their clothing once a year, and this is called *moulting*.

Feathers are much exposed to the air, which dries them; they are apt to be broken and torn in thickets, among rocks, in wars and amid labors, and therefore need renewing. The vernal change in the plumage of birds is owing to the same cause as the change of their voices from the chirp to the song; and in a state of nature the two cease together. This change bears some analogy to the blossoming of plants; while the autumnal moult more resembles the fall of the leaf.

All birds are furnished with a gland near the tail, from which they press with their bills a kind of oil, that serves to dress their feathers and preserve them from injury during rain, or while immersed in water.

In certain species the winter plumage differs in its hues from that of the summer; and in the greater number the female differs from the male by colors less vivid, and the young of both sexes then resemble the female.

As the changes in the plumage are the consequences, not the causes, of maturity in birds, and the physiological change must take place in the more sentient part of the system before it affects the feathers, it agrees with all the analogies of nature as well as with the facts, that most birds, and indeed

all birds, which are a year or two in acquiring their permanent plumage, breed before that is acquired.

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Birds which must get their living on the wing, shed two feathers of their wings at the same time, one from each wing; thus keeping the balance exactly adjusted.

The season of moulting is a dangerous one, and many birds die in consequence.

The connexion between the song and the plumage, and the silence and the moult, is a very curious matter, and shows that the whole bird is subject to some general law, which, though it lies deep beyond the power of our divination, governs even the minutest circumstance—the production of a new spot or gloss on a feather, the reddening of a comb or a wattle, or the inspiration of courage in birds naturally timid. The birds, in fact, blossom in the spring as well as the plants, and when the purpose of nature is accomplished, the bloom of the one is shed as well as that of the other.

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PROCURING FOOD. From what has been said of the internal structure, the powers and flight of birds, we may infer much concerning their modes of procuring food; though this subject will be frequently touched upon when speaking of the different orders, genera and species.

Every part of nature is full of food; and to every department of food there is created a race of animals fitted to feed upon it. A portion of this fulness is appropriated to the birds. They can eat what others cannot, and others can eat what they cannot. In the department appropriated to birds there is a great diversity of nutriment; and what one species can eat, another will not. Every order of birds, by this wonderful arrangement, may be said to have its appropriate food secured and even secreted for it. It is provided with all requisite knowledge of the food and of the place where it is kept, and, furthermore, furnished with the apparatus necessary to obtain it. Thus nature guards a particular bird's breakfast on every side but one, and that bird only can come at it upon the unguarded side. For example: what bird but the Woodpecker can stand on the upright trunk of a tree and sound along its bark till it finds the hiding place of a worm, and can then bore his hole with his beak, run in his forked tongue, and drag out his prey?

With equal care nature provides every bird his breakfast, and lets him be assured that it is guarded well till he comes for it. Thus, too, the whole creation is fed, without any more infringing on each other's rights than is necessary to balance opposing forces.

This system of universal adaptation explains many mysteries. Those birds which feed by day have an apparatus for the purpose which would be useless in the night. Those which feed in darkness have sombre night-colored feathers, that they may be unobserved. They have also exceedingly soft plumage, so as to strike the air without being heard. The wings of the eagle make an alarming noise, while the owl will not even frighten the mouse which he surprises in its exposure.

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NESTS. Bird-architecture is full of curiosities, and the variety of nests is truly marvellous, each indicating the character of the bird and its exposure to storms and enemies. Nature having given the instinct of construction to these feathered tribes, each one builds its first nest almost as well as its fifth or tenth; and this, too, whether it ever saw a nest built or not. Young birds have been taken from their nest and put into a large aviary, where no one of their feather was present to teach them, and they have built nests exactly like those of their relatives in the forest.

Each bird, by instinct, knows not only its enemies, but their mode of attack, and therefore constructs a nest so as to defend its young from all danger. Those whose young are the most feeble, build the best and warmest shelters; while

those whose young are able to run about as soon as they are born, or which are covered with down, build very rough and cold nests. Among those which build cold and slender nests, the male does not assist in incubation; while those, on the contrary, whose young have no down, construct warm nests, and the male does assist.

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The number of eggs laid by any bird is in most cases fixed; though in some species there seems to be no natural limit. Some lay only one; others two; many vary from three to four; some have as many as six; a few lay even eight and ten, while our common hen has sometimes numbered a hundred. The Eagle has but two, one of which is a male and the other a female. The Wren has from twelve to fifteen. The Ostrich lays a great number, which fact seems an exception to the general rule, namely, that the smaller birds lay more eggs than the larger. Domesticity increases the fecundity, as is illustrated in our hen, tame duck and turkey.

The wisdom of nature how apparent here! The diving birds generally lay but one egg. How wonderful, therefore, is that law of the world, which under such circumstances keeps equal the number of male and female birds! The great doctrine of check and balance, which penetrates with such controlling power every rank of being, shows itself here to the dullest eye; and who does not see that it is a subject to task the highest intellect, and to challenge the profoundest analysis? Take the common Duck and the Fulmar Peterel; the former lives among the dwellings of man, where it is used for food, and it lays from twelve to twenty eggs in one nest; while the latter nestles in the cliff, sweeps the entire ocean for its food, and lays but a single egg; and yet there are more of the latter birds than of the former!

Circumstances vary the habits of some birds in the matter of which we are speaking. If the Sparrow loses her eggs, by a hungry crow or a wicked boy, she lays four new ones; and our domestic hen will continue to lay for months, if she finds daily only one egg in her nest.

Another circumstance is food. If we feed hens with dry substances, such as powdered oyster-shells or old lime-plaster, we shall find them producing eggs for a much longer time. Many hens do not lay in winter because they cannot find anything to eat out of which the shell of the egg can be formed.

It is said that the roundest eggs contain males, and the longest ones females.

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eggs; and the degree best adapted to this process is the natural warmth of the parent's body. The eggs are generally turned over several times in order to distribute the heat equally. That the body of the mother-bird may be brought into more direct contact with the eggs, the feathers on the under side of the bird are shed just before the sitting season.

The embryo is in the white of the egg, and the yolk is the food which nature provides for the young one while it is growing within the shell. The young bird has on the tip of its beak a horny point, which serves to break the shell, and which falls off a few days after birth.

The time required for hatching varies in the different orders. The Humming-Bird takes but twelve days; the Canary, sixteen; the Hen, twenty-one; the Duck, twenty-five; the Swan, forty. With some species both parents share the labors of incubation; but, where the mother alone sits till the eggs are hatched, there her mate brings her food; and what doubtless she finds quite as agreeable, he sits on a neighboring tree and sings to her, thus assuring her of safety and of his sympathy in her cares. Some of the sweetest songs of our woods and gardens are these daily concerts amid the watchings of connubial affection. Those birds, like the

Thrush, which sing late in the season, have this same motive; for they rear two broods annually.

The Ostrich of the temperate zone covers her eggs, while the Ostrich of the torrid leaves them to the heat of the sun. It is easy to hatch eggs by artificial heat. In some places the farmers, who supply the market with poultry, put great numbers of eggs into wool, and then place them in a large open oven where the heat is carefully regulated, and in due time all the eggs are hatched.

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Among the Gallinaceous tribes, many species keep their young with them, like the common hen, for some months, and watch to shield them from enemies and select for them food. The young gather themselves under the wing of the mother, and at her alarm-cry they hasten under some roof or rock where the hawks cannot reach them. The hen, when she finds any food, gives the notice to her little ones and they hasten to seize it; while the mother-turkey devours all she can see, contenting herself to lead her children where food can be found. At night the turkey spreads her wings over her brood. The time comes when both these parents give notice to their several children that they must take care of themselves. This paternal hint is by gentle but expressive pecks of the bill. This unambiguous expression of the mother's mind soon teaches them to keep at a respectful distance, and the consequence is a speedy alienation. After the separation has taken place and the estrangement has been consummated, then they can come together again, but only on the same terms as other birds. The relationship is never acknowledged.

Among the Pigeons (*Plates 178-182*) there are two eggs in each nest, one of which contains a male and the other a

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female; and these two birds, when fledged, join their fortunes, like the eagles, for life. They become part of the parental household, and, unlike the young eagles, are not driven off to seek their fortunes alone. After the young pigeons are fledged, the two parents feed them for a considerable time, and they are provided with a singular apparatus for this very purpose. They have glands for secretions intended to feed their little ones, and thus give them food already half digested. If you narrowly watch the process of feeding, you will see that the pigeon does not give nourishment to its young by its bill, as other birds do, but it puts its bill half-opened into the young one's mouth, and at that moment the prepared food is brought up by a peculiar action of the gullet, and delivered into the throat of the squab.

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The Cow-Bunting is polygamous. They feed in small flocks; but when the female separates from the company, her departure is not noticed; no gallant partner accompanies her, nor manifests any solicitude in her absence; nor is her return greeted by that gratulatory tenderness that so eminently characterizes the males of other species. This is explained by the general economy of this singular bird. Her egg is somewhat larger than that of the Blue-Bird, and is thickly sprinkled with grains of pale brown on a dirty white ground.

The habits of the European Cuckoo and our Cow-Bunting, in confiding their young to foster-parents, belong to no other birds; and we are not satisfied with any of the explanations given of the phenomenon. There is nothing peculiar in the anatomical structure of these birds which can render them incapable of incubation; and the strange fact remains, that here are two species of birds in whom the usual love of the natural offspring seems wanting. We also find a powerful desire, in some other birds, to preserve and rear to maturity the usurper of their own children's rights. More light will dissipate the obscurity around this subject, as it has from several subjects of much darker hue.

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There are many species which are gregarious during only a part of the year. To mention but one example: the Bob-o'-Lincolns, when first arrived at the North in spring, are found together only in pairs. In this condition they make their journey, and in this solitary state they live until after midsummer, when they become gregarious, and thus continue through the winter. They come north in pairs, and return in flocks. It is the same with many birds. They are solitary during the breeding season, and congregate when that is past.

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TABLE OF BIRDS.

Order, or Birds of Prey.	Passerine, or Migratory Birds.	Scansoria, or Climbers.	Gallinacea, or Poultry.	Grallatoriae, or Waders.	Palmipedes, or Web-footed.
Talons exceedingly strong, armed with pointed, hooked nails;	A single toe directed backwards, and three forwards.	Two toes directed backwards, and two forwards.	Superior mandible arched or vaulted; nostrils partly covered by a soft, inflated scale; gait heavy; wings short.	Wading, the tarsus being very long, and the lower part of the leg naked.	Swimming, the toes being palmate, and the legs short, and placed far back on the body.
Beak generally pointed, and not vaulted above	Beak generally long, and body erect.	Beak generally long, and body erect.	Beak generally long, and body erect.	Beak generally long, and body erect.	Beak generally long, and body erect.
Toes feeble, and not armed with sharp hooked nails.	Toes feeble, and not armed with sharp hooked nails.	Toes feeble, and not armed with sharp hooked nails.	Toes feeble, and not armed with sharp hooked nails.	Toes feeble, and not armed with sharp hooked nails.	Toes feeble, and not armed with sharp hooked nails.
Terrestrial, whose feet are not formed either for swimming or wading, having	Terrestrial, whose feet are not formed either for swimming or wading, having	Terrestrial, whose feet are not formed either for swimming or wading, having	Terrestrial, whose feet are not formed either for swimming or wading, having	Terrestrial, whose feet are not formed either for swimming or wading, having	Aquatic, whose feet are formed for
BIRDS.					

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THE DIFFERENT ORDERS OF BIRDS.

THE number of species of birds already known is about five thousand; and as the organization of them all is somewhat similar, it is very difficult to classify them with satisfaction. The organs which best guide the student are the beak, feet and wings; they having most direct relation to the mode of procuring food.

The *Classification* of Cuvier seems to have the most authority, which divides all the birds into the six following orders, viz. :—

- | | |
|---------------------|------------------------|
| 1. BIRDS OF PREY. | 4. GALLINACEOUS BIRDS. |
| 2. PASSERINE BIRDS. | 5. WADERS. |
| 3. CLIMBERS. | 6. WEB-FOOTED. |

To show in brief the more prominent characteristics of the six orders, we refer to the tabular view on the preceding page.

The names used in Zoology to distinguish the different parts of the animal kingdom, are *Divisions, Classes, Orders, Families, Genera, Species and Individuals.*

The animal kingdom is composed of *individuals*; but numerous individuals are found to resemble each other, and they reproduce themselves with the same essential characters; all these individuals, when considered together, we call a *species*; as the *white* man, the *terrier* dog, the *golden* pheasant, the *green* lizard, the *pond* perch, the *yellow* wasp, the *paper* nautilus, and the *sea* anemone.

When we find many animals that agree in their general form, movements and tastes, though they essentially differ in small particulars, we group them together under the name *genus*. Thus we say the genus *Eagle* includes *all* the eagles in the world, though there are several different *species* comprised under this one generic name.

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In this family are found the birds so famed in falconry.

The two families are distinguished in the following table:

ACCIPITRES, OR RAPACES.	Diurnal.	Eyes directed from the side; the head and neck well proportioned; the external toe directed forward, and almost always united to the middle toe by a small membrane.
	Nocturnal.	Eyes directed forward; head very large and neck very short; external toe may be directed either forwards or backwards.

The family of *Diurnal* Birds of Prey are grouped in three principal tribes, distinguished as follows:

DIURNAL ACCIPITRES, having	Eyes even with the head, and talons proportionally feeble.	A more or less considerable part of the head and neck destitute of feathers.	Tribe. VULTURES.
		Head covered with feathers.	GRIFFINS.
	Eyes surrounded by a projecting eyebrow, which makes them appear sunk in the head; talons very strong.		FALCONS.

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BIRDS OF PREY.

(*Accipitres.*)

THIS order includes most birds which feed on flesh; and corresponds to the order of carnivorous animals among the mammalia. Nature has fitted their organization to the modes they must adopt in procuring food. They are armed with a terrible power. Their frames throughout show strength of muscle and speed of wing. Their beak is short; and the upper mandible, which is longer than the lower, is bent downwards at its end, and has a sharp point. Their legs are short and large. Their toes, three before and one behind, are free, and only partially united by an elastic membrane. Their extremities are armed with sharp, crooked claws, generally retractile, and of firmer consistence than bone. The hind toe and the interior one are the strongest. The sternum, which gives support to the muscles of flight, is remarkably developed. Their wings are immense. Their sight is piercing, to a proverb. Their nostrils are open, and lined by a membrane called *cere*, which covers the base of the beak.

Their tongue is bifid, or divided at the point. The females are larger than the males. They pair for life, and probably better deserve that praise for constancy which poetic fiction has awarded to the turtle.

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They would kill themselves by thus filling their stomachs with indigestible substances, had not nature given those which do this the faculty of regurgitation, by which they cast up in balls all which they cannot digest. They can endure hunger longer than any other birds, because their food is occasionally very scarce, so scarce that they have sometimes been known to die of starvation; yet, after the most extended meal, it is said that some of them can go nearly a month without eating!

This order is divided into two families, viz., the *Diurnal*, which seek their food by day, and the *Nocturnal*, which seek theirs by night.

DIURNAL BIRDS OF PREY. (*Plates 154, 157, 171.*) This first family of this order of birds have moderately-sized eyes, placed on the sides of the head; the base of their bill is covered with a membrane, called the *cere*, in which the nostrils are pierced. Their body is covered with a thick down, and protected by feathers whose barbs are close and resisting; thus enabling them to fly long at the highest elevations without any inconvenience from the excessive coldness of the upper atmosphere. Their wings are large and strong, their 'merry-thought' bone is semicircular and very open, the better to resist the violent pressure of the shoulder during flight. Their sight is so long and penetrating, that they will descend from the loftiest elevations, almost with the speed of lightning, and without touching the ground will seize a small animal that is hiding among the bushes.

The young undergo no change of feather until their second autumn; and they renew their plumage slowly, and in no instance more than once in a year; its seasonal change is confined to a slight wearing off of the margins of the feathers, rather than a natural shedding. In several species, however, the color indicative of maturity is partially acquired, previously to moulting, by a change of hue in the first or nestling plumage. These birds come to their growth in four years, and as their plumage is each year more advanced, one bird during this time may appear to belong to four different species.

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FALCONS (*Falco*, LIN.) These constitute the second, and by far the most numerous division of the diurnal birds of prey. There are about two hundred and thirty species. They have the head and neck covered with feathers; their eye-brows, except in the Osprey, form a projection, which occasions the eye to appear sunk, and imparts a very different physiognomy from that of the Vultures. The female is generally one third larger than the male.

This genus is subdivided into two sections, — the *Noble* and the *Ignoble Birds of Prey*. Their classification and more salient features are briefly noticed in the annexed table.

The principal European species of this genus are the Peregrine Falcon, the Jer Falcon, Hobby, Red-legged, Kite, Merlin.

We have in America a vast number of birds of prey, known under the familiar names of Eagles and Hawks, and we must refer the student to the excellent works on American birds for a description of them.



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Genera.

Diurnal Birds of
Prey of the tribe
of Falcons, having
the wings

Pointed.

*Noble
Birds
of
Prey.*

The superior mandible armed with a notching near its point.

The upper mandible having only a scallop near its point.

Falcons,
properly so called.

Jer Falcons.

Truncate
at the
end.

*Ignoble
Birds
of
Prey.*

Beak very strong, straight at the base, and curved only towards the point.

Eagles.

Beak
curved from
its base;

Strong; wings moderate, - - -

Goshawks.

Feeble;
wings
long.

Tail forked, - - -

Kites.

Tail
equal.

Feathers between the
eye and beak.

Honey-Buzzards.

A naked space between
the eye and beak.

Buzzards and
Harriers.

TABLE OF FALCONS.

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ERRY BIRD (*Bombycilla carolinensis*, BRISS.
A beautiful bird.

CEDAR OR CHERRY BIRD (*Bombycilla carolinensis*, BRISS. — Plate 25.) This beautiful bird is gregarious, and ranges from the Atlantic to the Pacific. It is not regular in its appearance at any given place, but comes at long intervals, as if forced by local penury to seek elsewhere the food it cannot find at home. Its general color is light greyish-brown, passing behind into ash grey, before into pale brownish-red, of which last color is the upper part of the head. The reddish crest on the top of the male's head is easily distinguished. They do not breed until July, and a naturalist asks you, contemplative reader, if you know why they are so tardy in laying their eggs and rearing their young?

The appetite of this bird is so extraordinary, that it devours any fruit or berry that comes in its way. One in a cage was known to eat apples until it was suffocated. They are the particular enemies of the canker-worm, and wherever they are allowed to come unmolested, those terrible scourges are kept in natural subjection. He who kills one of these birds gives existence thereby to thousands of canker-worms. When will finite men cease to adjust the forces of nature contrary to the ordinations of infinite intelligence?

The flight of these birds is easy. They move in close bodies, making various circumvolutions before they alight, and then coming down together in such numbers as to seem to be touching each other.

They are not timid birds. The presence of a scarecrow on a cherry-tree seldom prevents their feasting on the fruit; they look upon one of these 'guardian angels' with its outstretched arms and dangling legs as intended to frighten other birds!

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SWALLOWS (*Hirundo*, LIN. — Plates 162, 163.) They are remarkable for their close plumage, the extreme length of their wings, and the rapidity of their flight. Of all birds they have proportionably the longest wings, and fly with the greatest speed. The tail is forked, and consists generally of twelve feathers; the external ones being remarkably long, make the fork extremely deep. Their very short feet have, as in the Swifts, a peculiar character, the thumb being direct-

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ed forward almost as much as the other toes, and the middle and outer toes having each but three phalanges, like the inner one. Their feet and legs are slender and light, because they need to use them very little, and they would, if large, be a troublesome weight to carry.

Their sight has, by experiment, been found to be so acute, that from a distance of four hundred feet they can discern an object not more than half an inch in diameter, and how much less than that is not known.

Of the eight different species in America we have space only for one example.

BARN-SWALLOW (*Hirundo rustica*, LIN. — Plate 162.) 'The Swallows have come.' How delightful is this announcement in spring! We are sure that the bird-expelling winter is gone, and the bird-inviting summer is at hand. How gay, innocent and active is this little bird! With what peculiar

rapidity he sweeps through the air, and in most graceful curves and circles performs his easy evolutions. He delights our sense of seeing as much as the Mocking-Bird does that of hearing. Now mark the gambols of a company of these birds! In fine, calm weather their circuits are performed at a considerable elevation, with a lightness and ease that are truly admirable. They play over the river, the field, or the city with equal grace, and during spring and summer you might imagine their object was to fill the air around them with their cheerful twitterings. When the weather lowers they move more swiftly in tortuous meanderings over the meadows and through the streets of the towns; they pass and repass, now close to the pavement, now along the walls of the buildings, here and there snapping an insect as they glide along with a motion so rapid that you can scarcely follow them with your eye.

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PURPLE MARTIN (*Hirundo purpurea*, LIN. — Plates 167, 168.) This bird loves to come year after year and make its nest in the box set up for it in the farmer's front yard; and he seems an equal favorite with the Indian, who arranges a calabash over the door of his hut, that he may engage the Martin to keep insects from the venison and skins he would dry in the sun.

It is worth while to keep Martins near the house for the purpose of waking up the family at an early and healthy hour, for they trumpet out their morning call as soon as day salutes the east.

All Swallows go South in autumn, and they return in the following order: first, the Bank-Swallows, then the White-Bellied, then the Purple Martin, then the Barn, and lastly the Chimney-Swallows.

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SONG-FINCH (*Fringilla melodia*, WILS. — Plate 74.) This bird in Massachusetts is called *Ground-Bird*, because it builds its nest on the ground; and *Hair-Bird*, because it lines its nest with hair; and *Spring-Bird*, because it is the first visitor, from the cypress swamps of the South, which gives us a song. It is quite a performer, and it swells out its clear notes as if it were resolved to bring the farmer's daughter to the door to listen. It salutes us even before the Pewee or Blue-Bird. Its sweet and earnest trills resemble the Canary's, and they are continued through the summer, because this bird raises three broods a year, six in the first, five in the second, and three in the third brood. No wonder that these Sparrows are more numerous than those of any other species. Birds of prey devour so many of them, that with all their industry they do no more than keep their numbers good.

This little vernal songster, which skips about from tree to bush, all full of life and music, is of a brownish hue above, and whitish underneath. Its eggs are of a very broad, ovate

form, light greenish-white, speckled with dark umber, the specks larger towards the greater end. The male assists in the process of incubation, during which one bird feeds the other in succession.

All birds are remarkably clean during the breeding season; but this is the cleanest of the clean. Her nest seems as clean after the young are fledged as it ever was; nevertheless, she abandons it and constructs a new nest for her second brood! How can we account for this strange fact?

These birds eat seeds and insects, and are good friends to the farmer.

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This bird is very fond of silence; and, therefore, if you wish to see his mode of doing business on the surface of a brook or pond, you must remain very quiet. He is seldom found over turbulent or brawling streams, or where the wind curls or the mud darkens the waters.

The favorite resort of this bird is near quiet brooks, and especially water-mills, for there fish are easily caught. Where cascades occasionally cause the death of fish, there you will hear the rough, rapid, rattling notes of the King-Fisher, rejoicing over his good luck. At such times you may see him darting about in the sun, with his colors so gaudy that you might suppose a kaleidoscope-figure had taken wings to flit around you. When the angler finds him in a sequestered spot, near shallow and clear streams, he may be certain there

are trout somewhere near.

This bird digs a horizontal hole, three or four feet in length, into a bank, and there deposits its nest, made of sticks and feathers. There are generally six eggs, and they are all hatched in sixteen days, incubation being performed by both parents.

This bird is the *Halcyon* of the ancients, and there have been clusters of wild superstitions concerning it. It was once believed in Europe, that its feathers were a charm for love, and a protection against witchcraft, and a security for fair weather. It was believed, that if the body of the King-Fisher be suspended by a thread, some magnetic influence would turn its breast to the north. But the most curious of all was, that its nest was made of fish-bones and glue, and that this nest was placed by the bird on the sea at a time when it would be calm for fourteen days, which time would be long enough for incubation. On this account these fourteen days obtained, from this bird, the appellation of *Halcyon-days*. This fable has been much used by ancient and modern poets.

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Ducks are found in every part of the world. We have twenty-six different species in the United States, sixteen of which are sea Ducks, and the rest frequent ponds and lakes. (See examples on the last pages of *Plates*.) One character in the plumage of most of them is a patch upon the secondary quills, of different colors in the different species, but with a sort of metallic lustre; and thence called the 'speculum,' and also the 'wing spot,' or the 'beauty spot.'

HISTORY

OF THE

TOWN OF MEDFORD,

Middlesex County, Massachusetts,

FROM ITS FIRST SETTLEMENT, IN 1630, TO THE PRESENT TIME, 1855.

BY CHARLES BROOKS.

BOSTON:
PUBLISHED BY JAMES M. USHER,

87, CORNHILL.

1855.

"Plenque eorum que referam parva fortitan et levis memoriam videri, secius sum." — TACITUS.
 "Necne quid antea quam natus sis acciderit, id est semper esse puerum." — CLODIO.

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The farmers here experienced great inconvenience and alarm from the burning of woods. Such was the Indian system of clearing a forest; but it would not do where European settlements obtained. Our fathers therefore applied legislation to the matter in the following form: "Nov. 5, 1639. — Ordered, That whosoever shall kindle a fire in other men's grounds, or in any common grounds, shall be fined

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forty shillings. No fires to be kindled before the first of March."

They offered a small bounty on every acre of planted field. We presume that the Colony of Massachusetts was quite as far advanced in agricultural skill and productive harvests as that of Connecticut; therefore, we can judge from Mr. Wolcott's farm in Connecticut what and how much our Medford farmers raised. That distinguished magistrate says (1638): "I made five hundred hogsheads of cider out of my own orchard in one year!" We apprehend these hogsheads were not of the modern size, but were a larger kind of barrel. He says: "Cider is 10s. a hogshead." He gives an enumeration of products thus: "English wheat, rye, flax, hemp, clover, oats, corn, cherries, quince, apple, pear, plum, barberry-trees." A very tasteful catalogue! It sounds very little like scarcity or self-denial.

It seems that the land hereabouts was as rich and productive as in any of the neighboring states: nevertheless, it needed help from manure; and Johnson tells us, that in this region "there was a great store of fish in the spring time, and especially alewives, about the largeness of a herring. Many thousand of these they use to put under their Indian corn." They are sometimes so used at this day.

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It may be interesting to see the progress of vegetation in this locality. It is as follows: —

- " 1646, Aug. 1. The great pears ripe.
- " 3. The long apples ripe.
- " 12. Blackstone's apples gathered.
- " 15. Tankerd apples gathered.
- " 18. Kretton pippins and long red apples gathered.
- 1647, July 6. We began to cut the peas in the field.
- " 14. We began to shear rye.
- Aug. 2. We mowed barley.
- " Same week we shear summer wheat.
- " 7. The great pears gathered.
- Sept. 15. The russetins gathered, and pearmaines.
- 1648, May 26. Sown one peck of peas, the moon in the full. Observe how they prove.
- July 28. Summer apples gathered.
- 1649, July 20. Apricoks ripe."

As the soil and climate must determine what grains, fruits, and vegetables can be raised with profit, it soon became evident to our Medford farmers that Indian corn was to be a staple. Rye, barley, wheat, and oats were found productive

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as grains; peas and beans yielded abundantly; while turnips, beets, onions, and parsnips gradually grew into favor. Potatoes were not known to our first settlers; although among the articles, "to send for New England," from London, March 16, 1628, "potatoes" are named. The potato is a native of Chili and Peru. We think there is no satisfactory record of potatoes being in England before they were carried from Santa Fé, in America, by Sir John Hawkins, in 1653. They are often mentioned as late as 1692. Their first culture in Ireland is referred to Sir Walter Raleigh, who had large estates there. A very valuable kind of potato was first carried from America by "that patriot of every clime," Mr. Howard, who cultivated it at Cardington, near Bedford, 1765. Its culture then had become general. Its first introduction to this neighborhood is said to have been by those emigrants, called the "Scotch Irish," who first entered

Londonderry, New Hampshire, April 11, 1719. As they passed through Andover, Mass., they left some potatoes as seed to be planted that spring. They were planted according to the directions; and their balls, when ripened, were supposed to be the edible fruit. The balls, therefore, were carefully cooked and eaten, but the conclusion was that the Andover people did not like potatoes! An early snow-storm covered the potato-field, and kept the tubers safely till the plough of the next spring hove them into sight. Some of the largest were then boiled; whereupon the Andover critics changed their opinion, and have patronized them from that day. When the potato was first known in Scotland, it suffered a religious persecution, like some other innocent things. The Scots thought it to be a most unholy esculent, blasphemous to raise, and sacrilegious to eat. They therefore made its cultivation an illegal act; and why? "Because," as they say, "it is not mentioned in the Bible"! The prejudice against this unfending vegetable was so great at Naples, in Italy, that the people refused to eat it during a famine! We do not find that any epidemic has attacked this healthy plant until the potato cholera, which, of late, has nearly ruined it. The soil in Medford has been found particularly fitted for this plant, owing to a substratum of clay which keeps it moist. The early mode of preserving potatoes through the winter was to bury them below the reach of the frost, and shelter them from rain.

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NATURAL HISTORY.

The rocks are mostly primitive granite or sienite, existing in large masses. Some are in a state of decay, as, for

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example, the "pasture-hill gravel." This gravel is used extensively for garden walks, and its fineness and color make it a general favorite. The soil is composed mostly of silex and argilla, a mixture favorable to vegetation.

The flora of Massachusetts would be a fair one of Medford. The high hills, rocky pastures, large plains, alluvial intervalles, deep swamps, and extensive marshes, here give food to almost all kinds of trees, plants, shrubs, grasses, and sedges. The presence of fresh water and salt, also the mingling of them in Mystic River, produce a rich variety of herbaceous plants; and the salt-marsh flowers, though very small, are often very beautiful. Of lichens there are great varieties, and some rare specimens of the cryptogamous plants.

Of the forest-trees, we have many of the white and black oak, and some of the red and grey. The oldest survivor of this family of quercus stands in a lot owned by Mr. Swan, and is about half a mile north-east of the meeting-house of the First Parish. It is almost disarmed by time; and it therefore better stood the strain of the tornado of August 22, 1851. Its trunk is six feet in diameter near the ground; and it is probably as old as Massachusetts Colony. Two varieties of walnut are found among us, and "nutting" is yet a cherished pastime with the boys in October. The sycamore or plane-tree, commonly called buttonwood, abounds here by plantation. Of late years it has been suffering from a sort of cholera, which has destroyed its first leaves, and rendered its appearance so disagreeable as to induce most persons to remove it from sight. The violence of the disease seems past, and the tree gives signs of rejuvenescence. The graceful elms rejoice our eye wherever we turn, and our streets will soon be shaded by them. The clean, symmetrical rock-maple has come among us of late, and seems to thrive like its brother, the white. Of the chestnut, we have always known two large trees in the woods, but have never heard of more. The locust is quite common, and would be an invaluable tree to plant on sandy plains in order to enrich them; but a borer-worm has so successfully invaded, maimed, and stunted it that its native beauty is gone. The locust is the only tree under which the

ruminating animals prefer to graze. Of beach-trees we have not many, and what we have are small. So of the black and white ash, there is not an abundance. Once there was a good supply of the hornbeam; but that has ceased. Of birch, the black, white, and yellow, there are flourishing specimens.

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The class of forest evergreens is well represented in Medford. The white and pitch pines are common, though their use in building, and their consumption by steam-engines, have made them comparatively scarce. One of the most familiar, beautiful, and valuable forest-trees is the cedar; and both kinds, the red and white, are here. The hemlock and the holly are only casual among us. Whether all these trees were common when our ancestors first settled here, we cannot say; for there may have been then, what we now see, namely, a rotation of forest-trees. We have seen a pine-forest felled, and an oak one spring in its place; and, where the oak one has been felled, the pine has sprung up. In like manner, the cedar and maple forests have been rotatory!

Of indigenous shrubs, there is among us the usual varieties; among them, the hazel, the huckleberry, barberry, raspberry, gooseberry, thimbleberry, blackberry, &c. There are two species of wild grapes; if they ripen well, they are sweet and palatable, but are used often as pickles.

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The *birds*, now common with us, are those usually found in this latitude. As birds must follow their food, their migration northward in spring and southward in autumn enables us to see a great variety of these travellers. How powerful, how mysterious, is this impulse for change of place! God seems to have touched them with his spirit, and they became as obedient as the planets.

"Who bade the stork, Columbus-like, explore
Heavens not his own, and worlds unknown before?
Who calls the council, states the certain day?
Who forms the phalanx, and who points the way?"

Some birds, like the wild-geese and ducks, make all their journey at once; while most of them follow slowly the opening buds, the spring insects, and the spawning herring. A few leave Florida, and follow vegetation to the White Hills; they pass us in Medford during April and May, resting with us a few days "to take a bite," and to give us a song. The

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close observer might publish regular ornithological bulletins of their successive arrivals.

The rice-bird of Carolina, called the reed-bird in Pennsylvania, and the butter-bird in Cuba, is called here the bob-o-lincoln; and it amuses us greatly. The male, when he arrives, is dressed up as showily as a field-officer on parade-day, and seems to be quite as happy. Fuddled with animal spirits, he appears not to know what to do, and flies and sings as if he needed two tongues to utter all his joy. We might speak of the little wren, that creeps into any hole under our eaves, and there rears its numerous family; the humming-bird, that builds so skilfully in our gardens that we never find its nest; the yellow-bird, that makes the air resound with its love-notes; the thrush, that seems made to give the highest concert-pitch in the melody of the woods. To these we might add the night-hawk and the whip-poor-will, and many more that spend their summer with us; but these are enough to show that the dwellers in Medford are favored each season with the sight and songs of a rich variety of birds. We find the following record made March 8, 1631:

"Flocks of wild pigeons this day so thick that they obscure the light."

Another record shows that our fathers preserved the game by laws. "Sept. 3, 1634: There is leave granted (by the General Court) to Mr. John Winthrop, jun., to employ his Indian to shoot at fowl" (probably in Mystic River).

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The early histories tell of many, in other places, who became dissatisfied with their first choice, and moved to more promising localities; but not a word of complaint reaches us from the first planters of Medford, and no one, to our knowledge, left the plantation. They brought with them the *animus manendi*.

To show how fast the settlement went on, it is said, under date of Oct. 30, 1631, that "the Governor erected a building of stone at Mistick." The houses of the first settlers were fortified by palisades, thought to be a very necessary defence of themselves and their cattle against the nocturnal attacks of wild beasts and savages. It was not uncommon for a plantation to unite in building a stone or brick house, into which they could retire for the night, or escape from the Indians. In Medford were built three of these strong brick citadels, two of which yet stand. Obligated to depend in great measure for subsistence, during the first winter, upon food brought from England, there must have been an impatient waiting for spring; and, when it arrived, the whole population must have gone to work in clearing whatever open land could be used for planting.

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As soon as Gov. Winthrop had settled himself on the Ten-Hill Farm, in 1630, he recommended Gov. Cradock's men to plant themselves directly opposite him on the north side of the river. They did so. A promontory there, jutting towards the south into the marsh, was the only safe place then to build upon. It is about sixty rods south-east of the ancient house now standing on the farm of Messrs. James and Isaac Wellington. The marshes stretch away from this promontory, on every side except the north, where it joins the mainland. On its highest point they built the *first house erected in Medford*. This was in July, 1630. There are persons now living who knew an old lady, named Blanchard, who was born in that house. It was probably a log-house, of large dimensions, with a small, deep cellar, having a chimney of bricks laid in clay. The cellar was walled up with stone, and has been destroyed but a few years. The bricks, very similar to those in Gov. Cradock's mansion-house, have been in part removed. We have to-day (April 25, 1855) taken away half a dozen of them as specimens of the

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first manufactory in Medford. They are very large, very badly made, and burned to the hardness of granite. Thus fixed, in the most favorable position, Gov. Cradock's men passed the first winter; and were ready to proceed to business in the spring of 1631.

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Governor Cradock's House.—The old two-story brick house in East Medford, on Ship Street, is one of the most precious relics of antiquity in New England. That it was built by Mr. Cradock soon after the arrival of his company of carpenters, fishermen, and farmers, will appear from the following facts.

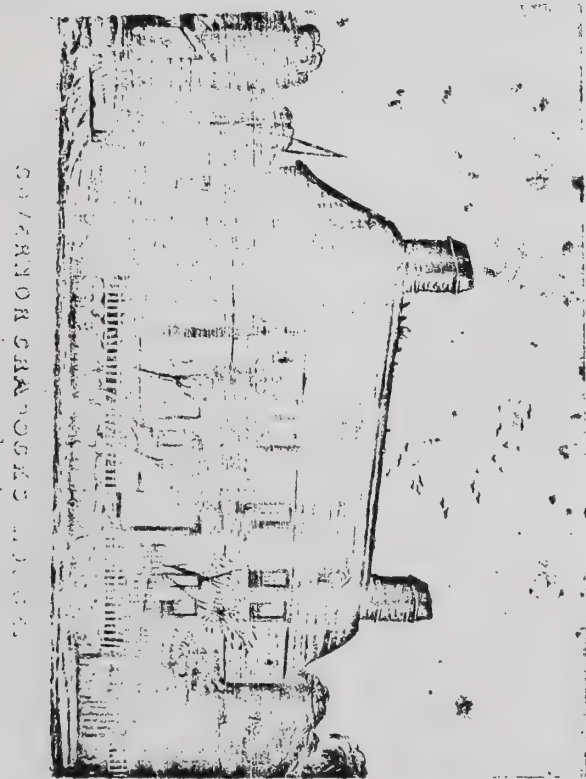
The land on which it stands was given by the General Court to Mr. Cradock. When the heirs of Mr. Cradock gave a deed of their property, June 2, 1652, they mentioned houses, barns, and many other buildings, but did not so specify these objects as to render them cognizable by us. There is no deed of this house given by any other person. There was no other person that could own it. It was on Mr. Cradock's land, and just where his business made it necessary: the conclusion, therefore, is inevitable that Mr. Cradock built it. There is every reason to believe that it was commenced early in the spring of 1634. Clay was known to abound; and bricks were made in Salem in 1629. Mr. Cradock made such an outlay in money as showed that he intended to carry on a large business for a long time, and

doubtless proposed visiting his extensive plantation. The very first necessity in such an enterprise was a sufficient house. The sooner it was finished, the better; and it was commenced as soon as the land was granted, which was March, 1634. Who, in that day, could afford to build such a house but the rich London merchant? and would he delay doing a work which every day showed to be indispensable? He was the only man then who had the funds to build such a house, and he was the only man who needed it. Taking all these circumstances into consideration, the inference is clear, that the "old fort," so called, was Governor Cradock's house, built in 1634. It is an invaluable historical jewel.

It has been called the "Fort" and the "Garrison House," because its walls were so thick, and because it had close outside shutters and port-holes.

It is certainly well placed for a house of defence. It is on land slightly elevated, where no higher land or rocks could be used by enemies to assail it, and is so near the river as to allow of reinforcements from Boston. Its walls are eighteen inches thick. There were heavy iron bars across the two large arched windows, which are near the ground, in the back of the house; and there are several fire-proof closets within the building. The house stood in an open field for a

[Between 46 and 47]



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century and a half, and could be approached only by a private road through gates. As the outside door was cased with iron, it is certain that it was intended to be fire-proof. There was one pane of glass, set in iron, placed in the back wall of the western chimney, so as to afford a sight of persons coming from the town.

It was probably built for retreat and defence; but some of the reasons for calling it a fort are not conclusive. Outside shutters were in common use in England at the time above mentioned; and so was it common to ornament houses with round or oval openings on each side of the front. These ovals are twenty inches by sixteen. Mr. Cradock's company

was large, and he was very rich, and had told them to build whatever houses they needed for shelter and defence. It is probable, that, as soon as the spring opened, they began to dig the clay, which was abundant in that place; and very soon they had their bricks ready for use. That they should build such a house as now stands where their first settlement took place, is most natural. The bricks are not English bricks either in size, color, or workmanship. They are from eight to eight and a half inches long, from four to four and a quarter inches wide, and from two and a quarter to two and three-quarters thick. They have the color of the bricks made afterwards in East Medford. They are hastily made, but very well burned. They are not like the English bricks of the Old South Church in Boston. The house has undergone few changes. Mr. Francis Shedd, who bought it about fifty years ago, found the east end so decayed and leaky that he took a part of it down and rebuilt it. There is a tradition, that in early times Indians were discovered lurking around it for several days and nights, and that a skirmish took place between them and the white men; but we have not been able to verify the facts or fix the date. The park impaled by Mr. Cradock probably included this house. It is undoubtedly one of the oldest buildings in the United States; perhaps the oldest that retains its first form. It has always been in use, and, by some of its tenants, has not been honored for its age. Its walls are yet strong, and we hope it may be allowed to stand for a century to come. We wish some rich antiquarian would purchase it, restore to it its ancient appendages, and make it a depository for Medford antiquities, for an historical library, and a museum of natural curiosities. It would then be an honor to our town; be

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Mr. Thomas Seccomb's large brick house, on the north side of the market-place, was the first copy of Col. Royal's. Rev. Mr. Turell's house, now owned by Jonathan Porter, Esq., is a good example of another style; also the one now owned and occupied by Gorham Brooks, Esq. The old dilapidated mansion of the late Dr. Simon Tufts, south-east corner of High and Forest Streets, is one of the oldest and best specimens of the second fashion which prevailed in New England. It has three stories in front, and the large roof behind descends so as to allow of only one story in the rear. It seems to lean to the south, to offer



Dr. Simon Tufts's House, 1725.

its back to the cold storms of the north. One enormous chimney in the centre of the building serves every need, and keeps the house steady in high winds. The house so long occupied by Gov. Brooks, and in which he died, is a newer specimen of the same model. The next fashion, introduced as an improvement upon these, was the broken or "gambrel-roofed" houses, many of which still remain. See a specimen at the end of this volume. These soon gave place to the present models, which are importations from distant ages and all civilized countries, not excepting Egypt and China.

The bridge over *Marble Brook*, in West Medford (called "Meeting-house Brook" in later times), was made of wood at first, and so continued for more than a century; it was then built of stone, in 1803, and so continued till 1850, when it was rebuilt of stone, and made as wide as the street. The same remarks belong to the small bridge, called "Whitmore's Bridge," farther west, and near the Lowell Railroad Station in West Medford.

There is one feature connected with each of the four bridges, herein described, which is worth a passing notice. It is this: These bridges were only half the width of the road, and thus allowed fording ways at their sides. It was formerly the custom for those travelling with horses or driving cattle to let their horses and cattle pass through the brook, and drink. The multiplication of wells, in public squares and frequented places, has helped to change the old habits; and now, generally, these "watering-places" are covered.

The God of heaven and earth preserve and keep you from all foreign and inland enemies, and bless and prosper this plantation to the enlargement of the kingdom of Jesus Christ, to whose merciful protection I commend you and all your associates there, known or unknown. And so, till my next, which shall be (God willing) by our ships, who I make account will be ready to set sail from hence about the 20th of this next month of March, I end, and rest,

Your assured loving friend and cousin,

MATHEW CRADOCK.

From my house in Swithin's Lane, near London Stone, this 16th February, 1628, stilo Anglicæ.

The confidence felt by the "Court" in Mr. Cradock's judgment was evinced by putting him first on that Committee which was to divide and apportion the lands in New England, thus deciding how and where the first settlements should take place. He did all he could to get the fleet in readiness to sail. On the morning of the 29th March, 1630, when the vessels were lying at Cowes, he made a visit to his friends, and consulted with them on the expediency of sailing on Easter Monday. Hubbard says: "They were advised so to do by Mr. Cradock (who was that morning on board the 'Arbella'), the late Governor, and owner of the two last ships." Gov. Winthrop says: "Mr. Cradock was aboard the 'Arbella.' We came to council. Mr. Cradock presently went back, our captain giving him three shots out of the steerage for a farewell." This gentleman, wise, good, zealous, honored, and rich, may be regarded, before any other individual, as the FOUNDER OF MEDFORD. There is no record of settlements earlier than those connected with him.

He was singularly cautious in selecting his workmen; and such an extensive establishment for fishing as he designed, supposes many collateral branches of trade. In 1631, his agent, Mr. Davison, had become so settled as to build a ship on the bank of the Mystic. The place probably was where Mr. Calvin Turner built his first ship, or at Rock Hill. Providing his fishermen with vessels as fast as possible must have made Medford a place of brisk trade and commercial consequence. These first movements of Mr. Cradock here were in keeping with his expansive mind and great wealth. We have proof of his wide enterprise in the following record: "Feb. 1, 1634: Mr. Cradock's house at Marblehead was burnt down about midnight before, there being in it Mr. Allerton and many fishermen, whom he employed that season.

Mr. Allerton fished with eight boats." Josselyn speaks of Mr. Cradock's plantation, in 1638, "on the west of Mystic River, where he has impaled a park;" unquestionably the first park for deer impaled in this country.

In 1630, Mr. Cradock provides a man (Richard Waterman), "whose chief employment," he says to his men at

Medford, "will be to get you good venison." The Company in England say (April 17, 1629), "William Ryall and Thomas Brude, coopers and cleavers of timber, are entertained by us in halves with Mr. Cradock, our Governor."

To express their sense of the value of Mr. Cradock's services for the Colony, the General Court, held at Newton, March 4, 1634, make him a grant of land in the following words: "All the ground, as well upland as meadow, lying and being betwixt the land of Mr. Nowell and Mr. Wilson on the east, and the partition betwixt Mistick bounds on the west, bounded with Mistick River on the south, and the Rocks on the north, is granted to Mr. Mathew Cradock, merchant, to enjoy to him and his heirs for ever."

is therefore attributed to the terrific noises made by railroad cars, as they cross the Mystic at Charlestown. The largest number of alewives taken by one draught from Mystic River was in 1844; and they counted some few more than fifty-eight thousand! We once saw taken, by one draught from this river, shad sufficient to fill six horse-carts. In Mystic River the bass have wholly disappeared; though there are those living who remember to have seen them plenty, and some of them weighing more than thirty pounds.

In 1776, a negro, named Prince, was at work on the bank of the river, opposite the shallow where the ford was, a few rods above the bridge, when he saw an enormous bass swimming very slowly up the river. The tide was inconveniently low for the bass, but conveniently low for the negro. Plunge went Prince for the fish, and caught him! No sooner was he out of water than a desperate spring, such as fishes can give, released him from his captor; and back he falls into his native element. Quick as a steel-trap, Prince springs upon him again, and again clutches him and lifts him up. The fish struggles; and Prince and fish fall together. Again Prince rises, with his prize in his arms, and then brings him ashore. It weighed sixty-five pounds. Prince thought that such a wonderful fish should be presented to the commander of the American forces then stationed on Winter Hill. His master thought so too. Accordingly, Prince dressed himself in his best clothes, and, taking the fish in a cart, presented it to the commander, and told the history of its capture; and the commander gave him six cents!

The places used by the first settlers of Medford for the burial of the dead are not positively known. Whether from unwillingness to follow England's example, in providing expensive and well-secured graveyards, or from their inability to do so, we cannot say; but the fact is clear, that such provisions for the dead were not made. The oldest gravestones in the present graveyard, near Gravelly Bridge, were brought from England, and are remarkable for their width, thickness, and weight. The oldest bears the date of 1691. It may be that some of our gardens are cemeteries, and that from human soil we gather our daily bread, while the spade and ploughshare lacerate the relics of our ancestors.

March 20, 1705: "Put to vote, whether the selectmen shall discourse Mr. Dudley Wade, referring to the proposals made this meeting by Stephen Willis, jun., in said Wade's behalf, respecting the burying-place in Medford, and make return thereof to the town at the next town's meeting. Voted in the affirmative."

It does not appear what this proposition was, nor what action the town had upon it. Probably it was a proposal to sell the town some land for a place of burial; and we presume it was accepted, because, May 15, 1717, we find the following record:—

"Put to vote, whether the town will choose a committee, to join with the selectmen, to view some land offered by Mr. Aaron Cleaveland and John Willis, for the enlargement of the burying-place near Mistick Bridge; and bring in a report to the town of the same, at

LETTERS OF A TRAVELLER;

NOTES OF THINGS

SEEN IN

EUROPE AND AMERICA.

BY WILLIAM CULLEN BRYANT.

SECOND EDITION.

NEW YORK.

GEORGE P. PUTNAM, 155 BROADWAY,

LONDON: RICHARD BENTLEY.

1850.

DEER IN THE LAUREL SWAMPS.

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LETTER XLII.

AN EXCURSION TO THE WATER GAP.

EASTON, PENN., October 24, 1846.

My yesterday's letter left me at Stroudsburg, about four miles west of the Delaware. It is a pleasant village, situated on the banks of the Pocano. From this stream the inhabitants have diverted a considerable portion of the water, bringing the current through this village in a canal, making it to dive under the road and rise again on the opposite side, after which it hastens to turn a cluster of mills. To the north is seen the summit of the Pocano mountain, where this stream has its springs, with woods stretching down its sides and covering the adjacent country. Here, about nine miles to the north of the village, deer haunt and are hunted. I heard of one man who had already killed nine of these animals within two or three weeks. A traveller from Wyoming county, whom I met at our inn, gave me some account of the winter life of the deer.

"They inhabit," he said, "the swamps of mountain-laurel thickets, through which a man would find it almost impossible to make his way. The laurel-bushes, and the hemlocks

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LETTERS OF A TRAVELLER.

scattered among them, intercept the snow as it falls, and form a thick roof, under the shelter of which, near some pool or rivulet, the animals remain until spring opens, as snugly protected from the severity of the weather as sheep under the sheds of a farm-yard. Here they feed upon the leaves of the laurel and other evergreens. It is contrary to the law to kill them after the Christmas holidays, but sometimes their retreat is invaded, and a deer or two killed; their flesh, however, is not wholesome, on account of the laurel leaves on which they feed, and their skin is nearly worthless."

I expressed my surprise that the leaves of the mountain laurel, the *kalmia latifolia*, which are so deadly to sheep, should be the winter food of the deer.

"It is because the deer has no gall," answered the man, "that the pison don't take effect. But their meat will not do to eat, except in a small quantity, and cooked with pork, which I think helps take the pison out of it."

"The deer," he went on to say, "are now passing out of the blue into the gray. After the holidays, when their hair becomes long, and their winter coat is quite grown, their hide is soft and tender, and tears easily when dressed, and it would be folly to kill them, even if there were no law against it."

PERSONAL NARRATIVE

OF A

PILGRIMAGE TO EL-MEDINAH AND MECCAH.

BY RICHARD F. BURTON,
LIEUT. BOMBAY ARMY.

WITH INTRODUCTION BY BAYARD TAYLOR.

*Our editions of Meccah must be drawn from the Arabian; as no unbeliever is permitted to enter the city, our travellers are silent.—*Others*, chap. vi.

With Map, and Two Illustrations.

FIRST AMERICAN EDITION.

NEW YORK:
G. P. PUTNAM & CO., 821 BROADWAY.
1856.

wetting the sheets that covered us; but who cares for such trifles in the Desert? The moon shone bright;* the breeze blew coolly, and the jackal sang a lullaby which lost no time in producing the soundest sleep. As the wolf's tail† appeared in the heavens we arose, mounted our camels, and resumed the march in real earnest. The dawn passed away in its delicious coolness, and sultry morning came on. Then day arose in its fierceness, and the noontide sun made the plain glow with terrible heat. Still we pressed onwards.

At 3 P. M. we turned off the road into a dry water-course. The sand was dotted with the dried-up leaves of the Datura, and strongly perfumed by a kind of Absinthe, the sweetest herb of the Desert. A Mimosa was there, and although its shade at this season is little better than a cocoa tree's‡ the Bedouins would not neglect it. We lay down upon the sand to rest among a party of Maghrabi pilgrims travelling to Suez. It was impossible to help pitying their state, nor could I eat, seeing them hungry, thirsty, and way-worn. So Nassar served out about a pint of water and a little bread to each man. Then they asked for more. None was to be had, so they cried out that money would do as well. I had determined upon being generous to the extent of a few pence. Custom, as well as inclination, was in favor of the act; but when the alms became a demand, and the demand was backed by fierce looks and a derisive sneer, and a kind

* "The sun shall not smite thee by day, nor the moon by night." (Psalm cxxi. 6.) Easterns still believe firmly in the evil effects of moon-light on the human frame. From Sindh to Abyssinia, the traveller will hear tales of wonder concerning it.

† The wolf's tail is the Persian name for the first brushes of grey light which appear as forerunners of dawn.

‡ We are told in verse of "a cocoa's feathery shade." But to realise the prose picture, let the home reader, choosing some sultry August day, fasten a large fan to a long pole, and enjoy himself under it.

of reference to their knives, gentle charity took the alarm and fled. My pistols kept them at bay, for they were only making an attempt to intimidate, and though I took the precaution of sitting apart from them, there was no real danger. Of the Maghrabis I shall have more to say when relating my voyage in the Pilgrim Ship: they were the only travelers from whom we experienced the least annoyance. Numerous parties of Turks, Arabs, and Afghans, and a few Indians, were on the same errand as ourselves. All, as we passed them, welcomed us with the friendly salutation that so becomes men engaged in a labor of religion.

Suez was now near. In the blue distance rose the castellated peaks and the wide sand-tracts over which lies the land route to El Hejaz. Before us the sight ever dear to English eyes,—a strip of sea gloriously azure, with a gallant steamer walking the waters. On the right-hand side lay the broad slopes of Jebel Mukuttum, a range of hills which flanks the road all the way from Cairo. It was at this hour a spectacle not easily to be forgotten. We drew up at a small building called Bir Suways (well of Suez), and under pretext of watering the cattle, I sat for half an hour admiring the charms of the Desert. The eye never tires of loveliness of hue, and the memory of the hideousness of this range, when a sun in front exposed each barren and deformed feature, supplied the evening view with another element of attraction.

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The fruit is prepared in a great variety of ways: perhaps the most favorite dish is a broil with clarified butter, highly distasteful to the European palate. The date is also left upon the tree to dry, and then called "Balah:" this is eaten at dessert as the "Nukliyat," the "quatre mendiants," of Persia. Amongst peculiar preparations must be mentioned the Kulladat el Sham. The unripe fruit is dipped in boiling water to preserve its gamboge color, strung upon a thick thread and hung out in the air to dry. These strings are worn all over El Hejaz as necklaces by children, who seldom fail to munch the ornament when not in fear of slappings, and they are sent as presents to distant countries.

January and February are the time for the masculation of the palm. The "Nakhwali," as he is called, opens the female flower, and having inserted the inverted male flowers, binds them together: this operation is performed as in Egypt upon each cluster. The fruit is ripe about the middle of May, and the gathering of it forms the Arab's "vendemmia." The people make merry the more readily because their favorite fruit is liable to a variety of accidents: droughts injure the tree, locusts destroy the produce, and the date crop, like most productions which men are imprudent enough to adopt singly as the staff of life, is subject to failure. One of the reasons for the excellence of Medinah dates is

the quantity of water they obtain: each garden or field has its well, and even in the hottest weather the Persian wheel floods the soil every third day. It has been observed that the date-tree can live in dry and barren spots; but it loves the beds of streams and places where moisture is procurable. The palms scattered over the other parts of the Medinah

plain, and depending solely upon rain water, produce less fruit, and that too of an inferior quality.

Verdure is not usually wholesome in Arabia, yet invalids leave the close atmosphere of El Medinah to seek health under the cool shades of Kuba. The gardens are divided by what might almost be called lanes, long narrow lines with tall reed fences on both sides. The graceful branches of the Tamarisk pearled with manna, and cottoned over with dew, and the broad leaves of the castor plant, glistening in the sun, protected us from the morning rays. The ground on both sides of the way was sunken, the earth being disposed in heaps at the foot of the fences, an arrangement which facilitates irrigation, by giving a fall to the water, and in some cases affords a richer soil than the surface.

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Leaving our camp at seven A.M., we passed over the grim stone-field by a detestable footpath, and at nine o'clock struck into a broad fumara, which runs from the east towards the north-west. Up this line we travelled the whole day. About six P.M., we came upon a basin at least twelve miles broad, which absorbs the water of the adjacent hills. Accustomed as I have been to mirage, a long thin

line of salt efflorescence appearing at some distance on the plain below us, when the shades of evening invested the view, completely deceived me. Even the Arabs were divided in opinion, some thinking it was the effects of the rain which fell the day before: others were more acute.* Upon the horizon beyond the plain rose dark, fort-like masses of rock which I mistook for buildings, the more readily as the Shaykh had warned me that we were approaching a populous place. At last descending a long steep hill, we entered upon the level ground, and discovered our error by the crunching sound of the camels' feet upon large curling flakes of nitrous salt overlying caked mud. Those civilised birds, the kite and the crow, warned us that we were in the vicinity of man. It was not, however, before eleven P.M., that we entered the confines of El Suwayrkiyah. The fact was made patent to us by the stumbling and the falling of our dromedaries over the little ridges of dried clay disposed in squares upon the fields. There were other obstacles, such as garden walls, wells, and hovels, so that midnight had sped before our weary camels reached the resting-place. A rumor that we were to halt here the next day, made us think lightly of present troubles; it proved, however, to be false.

During the last four days I attentively observed the general face of the country. This line is a succession of low plains and basins, here quasi-circular, there irregularly oblong, surrounded by rolling hills and cut by fumaras which passed through the higher ground. The basins are divided by ridges and flats of basalt and greenstone ave-

* It is said that beasts are never deceived by the mirage, and this, as far as my experience goes, is correct. May not the reason be that most of them know the vicinity of water rather by smell than by sight?

MEMOIRS

OF

BENVENUTO CELLINI,

A FLORENTINE ARTIST;

WRITTEN BY HIMSELF.

CONTAINING A VARIETY OF INFORMATION RESPECTING THE ARTS
AND THE HISTORY OF THE SIXTEENTH CENTURY.

WITH

THE NOTES AND OBSERVATIONS OF G. P. CARPANI.

TRANSLATED BY THOMAS ROSCOE, ESQ.

"Cellini was one of the most extraordinary men in an extraordinary age; his life, written by himself, is more amusing than any novel I know."—HOLLAND WALKER.

IN TWO VOLUMES.
VOL. I.

NEW-YORK:
WILEY & PUTNAM, 101 BROADWAY.

1845.

CHAPTER VI.

The Author learns to make curious Damaskenings of steel and silver on Turkish daggers, &c.—Derivation of the word grotesque in works of design.—His ingenuity in medals and rings.—His great humanity to Luigi Pulci is repaid with the utmost ingratitude.—Tragic end of Pulci, in consequence of his amour with Pantasilea.—Gallant behavior of the Author on this occasion, in defeating a band of armed adversaries.—His escape and reconciliation with Bevenuto of Perugia.

WERE I to give a complete account of all the works I had at this time for persons of different stations in life my narrative would become altogether tedious; suffice it at present to observe, that I exerted myself with the utmost diligence and care to acquire perfection in a variety of different arts, as above enumerated; and therefore with unceasing perseverance worked at them all. But as an opportunity has not hitherto occurred of giving an account of any of my remarkable performances, I shall wait until such a one offers. Michelagnolo of Sienna, the statuary, was at this time employed in erecting a monument to the late Pope Adrian. Giulio Romano the painter was gone into the service of the Marquis of Mantua;* the other members were retired to different quarters, as their business happened to lead them, so that our ingenious society was almost entirely dispersed.

Soon afterwards I met with some little Turkish daggers, the handles of which were of iron as well as the blade, and even the scabbard was of that metal. On these were engraved several fine foliages in the Turkish taste, most beautifully filled up with gold. I found that I had a strong inclination to cultivate

* The Marchese Federico Gonzaga, a valiant commander, and a liberal patron of the fine arts. He received his dukedom, in 1530, from Charles V. Giulio was introduced into his service by C. Baldassar Castiglione, in 1524. He was here very fortunate, and at the same time contrived to elude the just vengeance of the Pope, for designing a series of immoral prints, engraved by Marc Antonio, and accompanied with the sonnets of Aretino.

this branch likewise, which was so different from the rest; and finding that I had great success in it, I produced several pieces in this way. My performances, indeed, were much finer and more durable than the Turkish, for several reasons: one was,

that I made a much deeper incision in the steel than is generally practised in Turkish works; the other, that their foliages are nothing else but chickory leaves, with some few flowers of Echites: these have, perhaps, some grace, but they do not continue to please like our foliages. In Italy there is a variety of tastes, and we cut foliages in many different forms. The Lombards make the most beautiful wreaths, representing ivy and vine leaves, and others of the same sort, with agreeable twinings highly pleasing to the eye. The Romans and Tuscans have a much better notion in this respect, for they represent Acanthus* leaves, with all their festoons and flowers, winding in a variety of forms; and amongst these leaves they insert birds and animals of several sorts with great ingenuity and elegance in the arrangement. They likewise have recourse occasionally to wild flowers, such as those called lions' mouths, for their peculiar shape, accompanied by other fine inventions of the imagination, which are termed grotesques by the ignorant. These foliages have received that name from the moderns, because they are found in certain caverns in Rome, which in ancient days were chambers, baths, studies, halls, and other places of the like nature. The curious happened to discover them in these subterraneous caverns, whose low situation is owing to the raising of the surface of the ground in a series of ages; and as these caverns in Rome are commonly called grottos, they from thence acquire the name of grotesque. But this is not their proper name: for, as the ancients delighted in the composition of chimerical creatures, and gave to the supposed promiscuous breed of animals the appellation of monsters, in like manner artists produced by their foliages monsters of this sort; and that is the proper name of them—not grotesques. In

such a taste I made foliages filled up in the manner above-mentioned, which were far more elegant and pleasing to the eye than the Turkish works.

* Acanthus, called Brancuorsina, or Bear's claw.—Ed.

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the others then said to me, "Benvenuto, the hindrance we have been to you, however disagreeable, was intended for a good end. Let us now go to the assistance of the dying man." So we turned back, and went to the assistance of my brother, whom I ordered to be removed to a neighboring house.

A consultation of surgeons being immediately called in, they dressed his wound, but he would not hear of having his leg cut off, though it would have been the likeliest way to save his life. As soon as they had done, Duke Alessandro made his appearance, and spoke to my brother with great tenderness; the latter being still in his right mind, said to his excellency, "My dear lord, there is nothing I am grieved at, but that you are going to lose a servant, who may be surpassed by others in courage and abilities, but will never be equalled for his fidelity and attachment to your person." The duke desired he would endeavor to live, declaring that he knew him to be in all respects a valiant and worthy man: he then turned about to his people, and bid them supply the youth with whatever he wanted. No sooner was the duke departed,

commit some extravagant action, which would cause them to repent having any way molested me;" then disengaging both his legs, which we had put into a box, he made an effort as if he was going to mount on horseback, and turning his face about to me, he said three times, "adieu, adieu, adieu!" But at uttering the last, his generous soul departed. The hour for the funeral being come, which was about ten o'clock at night, I got him honorably interred in the church of the Florentines; and afterwards caused a fine marble monument to be erected over him, on which were represented certain trophies and standards. I must not omit that one of his friends having asked him, who it was that shot at him, and whether he should know him again, he answered in the affirmative, and told him all the marks by which he might be distinguished; and though he took the utmost care to conceal this declaration from me, I overheard all that passed, and intend in a proper place to give the sequel of that adventure.

To return to the tomb-stone above-mentioned: certain literati of the first rank who were well acquainted with my brother,* and greatly admired his prowess, gave me an epitaph for him,

but the overflowing of blood, which could not be staunch'd, affected my brother's brain, insomuch that he became the next night delirious. The only sign of understanding he discovered was, that when they brought the sacrament to him, he said, "You would have done well to make me begin with confessing my sins; it does not become me to receive that divine sacrament with this crazed and disordered frame. Let it be sufficient that my eyes behold it with a profound adoration; it will be received by my

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immortal soul, and that alone supplicates the Deity for mercy and pardon." When he had made an end of these words, and the sacrament was carried away, his delirium returned again: his ravings consisted of the greatest abominations, the strangest frenzies, and the most horrid words that could possibly come from the mouth of man; and thus he continued during the whole night, and till next day. No sooner had the sun appeared on the horizon, but he turned about to me and said, "Brother, I do not choose to stay here any longer, for these people might make me

telling me that so brave a youth well deserved it.—It was as follows :

"Francisco Cellino Florentino, qui quod in teneris annis ad Johannem Medicem ducem plures victorias retulit, et signifer fuit, facile documentum dedit quantæ fortitudinis et consilii vir futurus erat, ni crudelis fati archi-

*Varchi pays a high tribute to the bravery and worth of Francesco Cellini, in the eleventh chapter of his History, where he also speaks at length respecting Bertino Aldobrandi, the before-mentioned pupil of the same; who fell in a savage duel, near Florence, March, 1530.—See *Ammirato*.

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buso transfossus quinto ætatis lustro jaceret. Benvenutus frater posuit. Obiit die 27 Maii, MDXXIX."

"To Francesco Cellini, a Florentine, who as he had in his youthful days gained many victories for Duke Giovanni di Medici, plainly showed how brave and wise a man he would have proved, if he had not by a decree of cruel fate been shot by a musket in his twenty-fifth year. Benvenuto, his brother, erected this monument. He died on the 27th May, MDXXIX."

He was in the twenty-fifth year of his age; and though in the army was called Cecchino the musician, I chose to give him our family name, with the arms of Cellini.

This name I ordered to be carved in the finest antique characters, all of which were represented broken, except the first and last. Being asked the reason of this by the literati who had written the epitaph for me, I told them that the letters were represented broken, because his corporeal frame was destroyed; and those two letters, namely, the first and last, were preserved entire—the first in allusion to that glorious present, which God has made us, of a soul enlightened by his divine rays, subject to no injury; the last on account of the great renown of his virtuous actions.

This device met with general approbation, and the method was afterwards adopted by others. I caused the arms of Cellini to be wrought upon the same tomb-stone, in which I made some little alteration; for there are in Ravenna, a very ancient city, some of the Cellini family, who are respectable gentlemen, and have for their arms a lion rampant of the color of gold, in an azure field, with a red lily upon the right foot, and three little golden lilies upon the basis. This is the true coat of arms of our family; * my father showed me one which contained only the foot with the remaining particulars already described; but that of the Cellini of Ravenna pleases me most. To return to the devices which I ordered to be

* Such was Cellini's predilection for this coat of arms, that he has left us a drawing of them in black chalk, and in ink upon the card, under which is affixed the following notice, in his hand-writing:—"The original arms of the Cellini family, as worn by the gentlemen of the ancient city Ravenna, remaining in our house from the time of Cristofano Cellini, my great-grandfather, father of Andrea, my grandfather."

It is also stated in the Preface to Goldsmith's *Art*, edition of 1731. "We have for this reason subjoined the family arms thus preserved: to the portrait of our Author."

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made for the monument, and to the arms in particular: the paw of the lion was represented upon it, and in the room of the lily I caused an axe to be placed in the paw, with no other view but to remind me of revenging his injured manes.

Meanwhile I exerted my utmost efforts to finish the work in gold which I was employed in by Pope Clement: his Holiness was very earnest to have it completed, and sent for me two or

lived hard by a place called Torre Sanguigna, next door to a house occupied by a courtizan, whose name was Signora Antea, one of the richest and most admired, and who made the greatest figure of any of her profession in Rome. Just after sunset, about eight o'clock, as this musqueteer stood at his door with his sword in hand, when he had done supper; I with great address came close up to him with a long dagger, and gave him a violent back-handed stroke which I had aimed at his neck. He instantly turned round, and the blow falling directly upon his left shoulder, broke the whole bone of it; upon which he dropped his sword, quite overcome by the pain, and took to his heels.

three times a week to observe my progress. He was more and more pleased with it every time, but frequently found fault with the deep sorrow which I expressed for the loss of my brother. Seeing me one day more dejected than usual, he said to me: "Benvenuto, I did not think that you were so weak a man; did you never know that death is unavoidable? You seem to want to follow your brother." I took my leave of his Holiness, and went on with the work which he had put into my hands, as well as the business of the Mint; still thinking day and night of the musqueteer that shot my brother.

He had formerly been in the light cavalry, and afterwards entered as a musqueteer amongst the city-guards. What increased my vexation and resentment was, that he had made his boasts in these terms: "If I had not dispatched that bold youth, he alone would quickly have made us fly, which would have been an eternal disgrace." Perceiving that my solicitude and anxious desire of revenge deprived me both of sleep and appetite, which threw me into a lingering disorder, and not caring to have recourse to any treacherous or dishonorable means, one evening I prepared to put an end to my inquietude. This musqueteer

LES
VOYAGES
DE LA
NOUVELLE FRANCE
OCCIDENTALE, DICTE
CANADA,

FAITS PAR LE S^r DE CHAMPLAIN

Xainctongeois, Capitaine pour le Roy en la Marine du
Ponant, & toutes les Descouuertes qu'il a faites en
ce pais depuis l'an 1603. iusques en l'an 1629.

*Où se voit comme ce pays a esté premierement descouuert par les François,
sous l'authorité de nos Roys tres-Chrestiens, iusques au regne
de sa Majesté à present regnante LOUIS XIII.*

Roy de France & de Navarre.

Avec vn traité des qualitez & conditions requises à vn bon & parfait Nauigateur
pour cognoistre la diuersité des Estimes qui se font en la Nauigation : Les
Marques & enseignemens que la prouidence de Dieu a mis dans les Mers
pour redresser les Mariniers en leur routte, sans lesquelles ils tomberoient en
de grands dangers, Et la maniere de bien dresser Cartes marines avec leurs
Ports, Rades, Isles, Sondes, & autre chose necessaire à la Nauigation.

*Ensemble vne Carte generale de la description dudit pays faite en son Meridien selon
la declinaison de la guide Ayman, & vn Catechisme ou Instruction traduite
du François au langage des peuples Sauvages de quelque contrée, avec
ce qui s'est passé en ladite Nouvelle France en l'année 1631.*

A MONSIEGNEVR LE CARDINAL DVC DE RICHELIEV.



A P A R I S.

• Chez PIERRE LE-MUR, dans la grand' Salle
du Palais.

M. DC. XXXII.

Avec Priuilege du Roy.

me fit iuger que l'air y est plus temperé & meilleur que celuy où nous hyuernalmes, ny que les autres lieux de la coste. Les forests dans les terres sont fort claires, mais pourtant remplies de chesnes, hestres, fresnes, & ormeaux. Dans les lieux aquatiques il y a quantité de saules. Les Sauvages se tiennent tousiours en cel lieu, & ont vne grande cabanne entourée de palissades faites d'assez gros arbres rangez les vns contre les autres, où ils se retirent lors que leurs ennemis leur viennent faire la guerre; & courent leurs cabannes d'escore de chesnes. Celieu est fort plaissant, & aussi agreable que l'on en puisse voir: la riuere abondante en poisson, enuironnée de prairies. A l'entrée y a vn islet capable d'y faire vne bonne forteresse, où l'on seroit en seureté.

Les forests
dés les ter-
res sont fort
claires.

Saules en
quantité
les
lieux aqua-
tiques.

tient vne lieue de long, & demie de large. Depuis Chouïacoet iusques en celieu (où veismes de petits oiseaux, qui ont le chant comme merles, noirs hormis le bout des ailes, qui sont orengées) il y a quantité de vignes & noyers. Ceste coste est sablonneuse en la plus-part des endroits depuis Quinibequy. Ce iour nous retornasmes 2. ou 3. lieues deuers Chouïacoet, iusques à vn cap qu'auons nommé le port aux isles, bon pour des vaisseaux de cent tonneaux, qui est parmy trois isles.

Mettant le cap au nordest quart du nort proche de celieu, l'on entre en vn autre port où il n'y a aucun passage (bien que ce soient isles) que celuy par où on entre, où à l'entrée y a quelques brisans de rochers qui sont dangereux. En ces isles y a tant de groiselles rouges, que l'on ne voit autre chose en la plus-part, & vn nombre infiny de tourtes, dont nous en prismes bonne quantité. Ce port aux isles est par la hauteur de 43. degrez 25. minutes de latitude.

Costoyans la coste nous apperceusmes vne fumée sur le riuage de la mer, dont nous approchasmes le plus qu'il nous fut possible, & ne veismes aucun Sauuage, ce qui nous fit croire qu'ils s'en estoient fuis. Le Soleil s'en alloit bas, & ne peusmes trouuer lieu pour nous loger icelle nuit, à cause que la coste estoit plate, & sablonneuse. Mettant le cap au sud pour nous esloigner, afin de mouiller l'anchre, ayans fait enuiron deux lieues, nous apperceusmes vn cap à la grande terre au sud quart du suest de nous, où il pouuoit auoir six lieues: à l'est deux lieues apperceusmes trois ou quatre isles assez hautes, & à l'ouest vn grand cul de

Cap qu'ils
apperceoi-
uent à la

*Riuere de Chouïacoet. Lieux que l'Auteur y recognoist.
Cap aux Isles. Canots de ces peuples faits d'escore de
bouleau. Comme les Sauvages de ce pays là font reuenir
à eux ceux qui tombent en syncope. Se seruent de pierres
au lieu de conteaux. Leur Chef honorablement receu
de nous.*

CHAPITRE V.

LE Dimanche 12. du mois nous partismes de la riuere appelée Chouïacoet, & rangeant la coste, après auoir fait enuiron 6. ou 7. lieues, le vent se leua contraire, qui nous fit mouiller l'anchre & mettre pied à terre, où nous veismes deux prairies, chacune desquelles con-

ELEVEN WEEKS IN EUROPE;

AND

WHAT MAY BE SEEN IN THAT TIME.

BY

JAMES FREEMAN CLARKE.

Diserit hic aliquis, Quia uita necit; adfer aliquid nori.
*Examus.*BOSTON:
TICKNOR, REED, AND FIELDS.
M DCCCLII.

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ELEVEN WEEKS IN EUROPE.

Lauterbrunnen, and in the course of half an hour's walk, passed from a region of utter barrenness to one of luxuriant vegetation. Thousands of feet below, lay the valley toward which we descended; the path down was so steep that it went in zigzags, but on each side, nevertheless, were fields of grass. How they could ever be mown, and the hay raked, passed our wit to tell. One of my companions thought to make the way shorter by crossing these fields in a straight line, instead of keeping to the zigzag road; but he soon found it too steep to justify his standing upright; so he sat down, and attempted to slide down; but this also was dangerous, and there he sat, holding on to the grass, uncertain what to do. By the aid of his alpenstock however, he reached the road, with this practical experience of the portentous faithfulness of Swiss agriculture, which can make hay in places so steep that any body but a Swiss cannot stand upright.

No where in the world, I think, can such a combination of beauty be brought together as is to be found in the Valley of Lauterbrunnen. The name in German means, 'Nothing but brooks,'—and indicates one of its characteristics. The valley is a long and narrow one, extending from the foot of the Jungfrau, between precipitous and lofty hills, toward Interlachen. Over these perpendicular walls fall a thousand brooks, which hang like white threads or ribbons along their sides. The presence of so much water gives a peculiar character to the trees. Trees always conform to their situation.

In forests, all trees, no matter what may be their typical form, imitate the pine, and strain upward to the light in perpendicular shafts. By the

ELEVEN WEEKS IN EUROPE.

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side of running water, all trees imitate the willow and bend their limbs downward in bowery masses; and wherever the atmosphere is charged with moisture, the trees expand their branches in a peculiarly indolent and luxurious manner difficult to describe, but easily recognised. Whenever, therefore, you see a tree with its limbs hanging downward like those of a willow, you may be pretty sure that there are brooks running below the surface, if not visible above it; and when you see trees spreading themselves out in every direction, leaning their branches this way and that, like the trees which the Italian painters loved to draw in their picture of the Flight into Egypt, you may recognise the presence of an excess of aqueous vapor in the air.

Thus leaned and expanded the limbs of the walnuts, and beeches, and chestnuts, as we passed down toward Lauterbrunnen. High above us, the snowy Alps seemed to overhang the valley, though in fact miles away. Opposite to us waved in the wind the Staubbach, made famous by Byron, who compares it to the waving tail of the White Horse in the Apocalypse. This mountain torrent, on reaching the edge of the precipice, falls eight hundred feet without touching the rock on its way into the valley; before it has descended a third part of this distance, the resistance of the air has changed it into spray, and the wind drives it and bends it, this way and that, in snake-like curves.¹ We

¹ 'The torrent is in shape curving over the rock, like the tail of a white horse streaming in the wind, such as it might be conceived would be that of the "Pale Horse" on which Death is mounted in the Apocalypse. It is neither mist nor water, but a something between both; its immense height (nine hundred

1779.

I do not remember that we had either thunder or lightning during our stay, excepting on the night of the eruption of the *volcano*; and, from the account of the inhabitants, they are very seldom troubled with storms of this kind, and never but in a slight degree. The general severity of the winter, as well as the dreadful hurricanes of wind and snow that season brings along with it, cannot be questioned, from the subterraneous habitations the natives are under a necessity of retiring to, for warmth and security. Major Behm told us, that the cold and inclemency of the winter of 1779 was such, that, for several weeks, all intercourse between the inhabitants was entirely stopped, every one being afraid to stir, even from one house to another, for fear of being frost-bitten. This extraordinary rigour of climate, in so low a latitude, may be accounted for, from its being situated to the east of an immense uncultivated tract of country, and from the prevalence of the westerly winds, blowing over so extensive and cold a continent. The extraordinary violence and impetuosity of the winds, is attributed to the subterraneous fires, the sulphureous exhalations, and the general volcanic disposition of the country.

This peninsula abounds in *volcanos*, of which only three have, for some past, been subject to eruptions. We have already mentioned that which is situated in the neighbourhood of Awatska. Besides this, there are others not less remarkable, according to the account given of them by Kraschenicoff.

The *volcano* of Tolbatchick is situated on a neck of ground between the river of Kamtschatka and Tolbatchick. The mountain, from the summit of which the eruptions proceed, is of a considerable height, and terminates in pointed rocks. In the beginning of the year 1739, there issued from it a whirlwind of flames, which reduced to ashes the forests of the neighbouring mountains. This was succeeded by a cloud of smoke, which spread over and darkened the

THE

THREE

VOYAGES

OF

CAPTAIN JAMES COOK

ROUND THE WORLD.

COMPLETE

In Seven Volumes.

WITH MAP AND OTHER PLATES.

VOL. VII.

BEING THE THIRD OF THE THIRD VOYAGE.

LONDON:

PRINTED FOR

LONGMAN, HURST, REES, ORME, AND BROWN,

PATERNOSTER-ROW.

1821.

The wolves are only seen in the winter; at which season they prowled about, as I was told, in large companies, in search of prey.

There are rein-deer, both wild and tame, in several parts of the peninsula, but none in the neighbourhood of Awatska. It is somewhat singular, that this nation should never have used the rein-deer for the purposes of carriage, in the same manner as their neighbours, both to the north and the eastward. Their dogs, indeed, seem fully sufficient for all the demands of the natives in their present state; and the breed of Russian horses will, probably, increase with the future necessities of the country. But when it is recollected, that the use of dogs, in a great measure, precludes them from the advantage of bringing up any other domestic animals, it will appear the more extraordinary that they should not have adopted the services of an animal so much more gentle as well as powerful.

The *argali*, or wild mountain sheep*, an animal, I believe, unknown in Europe (except in Corsica and Sardinia), is here in great plenty. Its skin is like the deer's, but in gait and general appearance, it partakes more of the goat. It has two large twisted horns, sometimes weighing, when at full growth, from twenty-five to thirty pounds, which in running, it rests upon its back. These creatures are exceedingly nimble and swift, haunt only the most craggy and mountainous parts, and make their way among the steepest rocks with an agility that is astonishing. The natives work their horns into spoons and small cups and platters; and have frequently one of a smaller size hanging to a belt, which serves them to drink out of in their hunting expeditions. This animal is gregarious. I frequently tasted the flesh of them, and thought it had a very sweet and delicate flavour; but never had an opportunity of

* *Crapra amon.*

seeing one alive. I must, therefore, refer the reader for a particular description of this beautiful animal (for such it is said to be), to the *Memoirs* of the Academy of Petersburg, tom. iv. tab. xiii.

I have already observed, that the dogs of this country are, in shape and mien, exceedingly like the Pomeranian, with this difference, that they are a great deal larger, and the hair somewhat coarser. They are of a variety of colours; but the most general is a light dun, or dirty cream colour. Toward the end of May they are all turned loose, and left to provide for themselves through the summer, being sure to return to their respective homes when the snow begins to fall. Their food in the winter consists entirely of the head, entrails, and back bones of salmon, which are put aside, and dried for that purpose; and with this diet they are fed but sparingly. The number of dogs must needs be very great, since five are yoked to a sledge, and a sledge carries but one person; so that, on our journey to Bolcheretsk, we required no fewer than an hundred and thirty-nine, at the two stages of Karatchin and Natchikin. It is also to be remarked, that they never make use of bitches for the draft, nor dogs but those that are cut. The whelps are trained to this business, by being tied to stakes with light leathern thongs, which are made to stretch, and having their victuals placed at a proper distance out of their reach; so that, by constantly pulling and labouring, in order to come at their food, they acquire both the strength of limbs and the habit of drawing, that are necessary for their future destination.

The coast and bays of this country are frequented by almost every kind of northern sea-fowl; and amongst the rest are the sea-eagles, but not, as at Oonalashka, in great numbers. The rivers inland (if I may judge from what I saw in our journey to Bolcheretsk), are stored with numerous flocks of wild-ducks, of various species; one kind of which,

BY THADDEUS A. CULBERTSON.

[As already mentioned, Mr. Culbertson went from St. Louis to St. Joseph in a steamboat. He there, with his brother, Alexander Culbertson, Esq., took a carriage, and accompanied by some attendants proceeded to Fort Pierre, along the eastern bank of the Missouri. His narrative, as herewith presented, commences at a point some miles below Fort Pierre. With reference to the style of the narrative it should be recollected that the facts were noted down on the spot, without any intention of publication.]

Saturday, April 27, 11 A. M.—Yesterday was an exceedingly unpleasant day; we found a violent north wind blowing in the morning, nevertheless, as soon as breakfast was over, we were off on the cheerless prairie. We saw but little wood; the road was hilly and ponds frequent. About ten o'clock, we crossed a small stream that gave us some trouble on account of the deep mud; but cold as the day was, the Indians waded through without hesitation. About twelve o'clock we came to a place where the land was cut up into steep hills and deep ravines, the latter containing a little scrubby timber. At one o'clock we reached the spot where the Indians had confidently expected to meet their chief, Old Eagle, who had been there hunting buffalo, but he was not to be found. The Indians appeared much disappointed and looked very sad. They had left a good place for hunting buffalo, and had come here where there were apparently none.

There was every appearance of a violent snow-storm, but bad as our situation was, we were thankful that it was no worse; had these indications overtaken us the night before, when there was not a stick of wood within miles, we might well have been filled with apprehension, but here we had wood, water and grass, and were encamped in a ravine, well sheltered from the storm. About eight o'clock we retired to our beds in the wagon, anticipating a cheerless day of inactivity on the morrow. We were, however, agreeably disappointed, and at about four o'clock, I was awakened by the bustle of preparation for departure.

We started at half-past five o'clock, and soon crossed Choutain creek, the small stream on which we had encamped. Our course during the day, after we left the creek, was over level prairie, with no timber in sight or water to be found, though buffalo were abundant. I forgot to mention that just as we were leaving the river A'Jacques, a very large wolf, of pure white color, a beautiful animal, came walking leisurely towards us. A. shot at it, but missed, when it scampered off.

Sunday, April 28.—Yesterday, after dinner, we traveled about five hours, and then encamped on the shore of Lake Andy, a long and wide sheet of water about ten miles from the Missouri, and about sixty from the A'Jacques. Our road was over a fine prairie land, exhibiting more grass than we had previously seen. During the day I procured two specimens of a small plant which I had not observed before; also three specimens of animals, viz., a prairie squirrel, a prairie dog, and a dried salamander, which was found on the shore of the lake. The prairie dog was shot by Alexander at the first dog village that we met with. Two others were also fired at, but they escaped. Their motions are so quick, that even when wounded, they can scarcely be caught.

In the morning we started before five o'clock, and had a beautiful and pleasant day, with the exception of a strong head wind. The road at first was very hilly, but became less so as we advanced. No timber was seen except where we encamped there were some thorn bushes and a few small trees. Even this scanty vegetation supplied us with better fuel than the buffalo dung which we were obliged to use for our fire yesterday. In the morning we found the ravines filled and the distant hills covered with snow.

Tuesday, April 30.—This morning we were at our camp on the American Fork. On Sunday about sunset, we reached a good encamping ground on a small stream called Cow creek. The approach to this is over steep, irregular hills, covered with stones. Its margins are better timbered than those of any stream we have seen for several days. During the night we were awakened by the noise of the wind and the beating of the snow against the carriage. We expected to see the ground covered with snow in the morning, but were agreeably surprised to find this was not the case, and that the sun was shining in an almost cloudless sky. We started at half-past four, and traveled over a gentle rolling prairie without wood, but abounding in depressions filled with water, but which were probably dry in summer. At about half-past nine o'clock we reached the Butte Bijoux, which we had previously seen from far off covered with snow. It is a clump of hills rising very irregularly out of the prairie, and consisting of rocks, which have the appearance at a distance, of light-colored limestone.

At this place where we found wood, water and grass, we rested two hours, and then started for the American Fork. It was not without considerable hesitation that we determined to go on. The distance was eighteen miles; our horses had no provender except dry prairie grass, and were much weakened by cold and the long journey; we were, however, so anxious to get through, that we resolved to press on. Our route lay across a wide prairie, covered with burnt grass, without wood for many miles. Though the weather was warm when we started, it soon commenced blowing violently from the north, and in a few hours became intensely cold.

About four o'clock, we discovered at a distance a company of Indians, and we were soon observed by them, though they at first mistook us for a herd of buffalo. Two scouts soon reached us in full gallop, and we accompanied them to their encampment, which consisted of several lodges. At our arrival, men, women, children, dogs and horses, all came out to look at us.

Monday, May 27. — This has been a day of rain and mud, but in the evening it has cleared off beautifully. Spent the day in reading and writing. Made out this afternoon a tabular view of the Sioux nation, on the Missouri, so as to exhibit their numbers, divisions and localities. This has been executed under the inspection of Mr. Gilpin, who has been in this country for ten years, and is good authority on this subject; his account of the numbers of the different tribes was confirmed by six or eight Indians of authority who were in his room at the time.

Hodgekiss mentioned a singular fact this evening, namely, that the spring which is the head of the Yellowstone, gushes out in a strong stream of excellent and very cold water, and that about thirty yards from the source it

is divided by a large rock into two parts, one of which forms the Yellowstone River, and the other the Lewis Fork of the Columbia. He says the elk are far more numerous on the Yellowstone than we suppose—that in one place the Indians have made quite a substantial fort from their horns piled together, and that in another place quite a large hill has been formed by the number of these horns collected together.

I have for some time intended giving a description of Fort Pierre Chouteau and its environs, but have postponed it from day to day for no good reason. A person coming up the country on the other side of the river has his first view of it about half a mile below, and it then presents a most beautiful sight.

Three and a half o'clock, P. M. — We have just passed the mouth of the Little Missouri River, coming from the South; about one-hundred and twenty miles above Fort Clark. Mr. Picotte has just confirmed what I had previously heard about the abandonment of the aged and infirm by the Indians. He says that the Indians further east on Lake Superior and Winnepeg, are worse in this respect than the Missouri Indians.

He also informed me that since he first knew them in 1820, the Mandans, Rees and Gros Ventres, had probably lost five-sixths of their number. At the time mentioned, they were a large and flourishing people, but now the Rees and the Gros Ventres have each but one ordinary sized village, and the Mandans a very small one. The same thing is true of every tribe with a fixed place of residence. He assigned for the fact the following reasons: — When they remain long in one place the wood becomes scarce and they are obliged to encamp in winter at a distance from their residence in order to obtain fuel, but on account of danger from enemies and rise of water in the spring, they are obliged to return before winter breaks up, and to enter damp and cold houses which have been exposed all winter to the frost and snow; consequently many, especially the young and the aged, die of colds or other disease originating in the same cause. Also when they live in villages and inhabit mud houses they are more exposed to epidemics; and again, in a fixed position their enemies always know where to find and surprise them while working in their fields.

These are the reasons why he thinks that for years past those tribes

having fixed habitations, have decreased in numbers, and besides the above mentioned nations, he cites as instances, the Otoes, Omahaws, Pawnees and several others. While these have decreased, the Sioux, a wandering people, have greatly increased, their mode of life giving them the advantage in all the particulars mentioned.

The river has been on the rise for several days, and I have frequently thought of the theory, that when a stream rises it is higher in the middle than at the shores, and consequently the drift wood floats near the shores,

while in falling water the stream is lowest in the middle, and will therefore carry the drift there. My observation on two rises in the Missouri do not confirm that theory. I noticed that the drift has always been found in the current whether that be near the shore or in the middle, and Capt. Durack confirms this opinion, saying that such is the case generally in rising and falling waters; the drift always floats in the current. The shores to-day are generally gently ascending — occasionally abrupt and of sand and white clay.

Friday, June 14. — We are still in the Big Bend, which we entered last night, and shall not be out of it until we reach Knife river coming in from the north. This I take to be the stream marked on the map, Onion creek. There is also a Knife river below, on the south side, a few miles above Fort Clark. The Little Missouri is placed wrong on the map; it comes in a few miles below the Big Bend, not above. This bend is about ten miles across and thirty around. The weather is windy and cloudy — buffalo are plenty; early this morning some of our hunters went a-head of our boat and killed three bulls, which we stopped to take in. Soon after this was accomplished, a small herd was discovered trying to get up the bank on the west side, having just crossed the river. Many guns were fired, and three bulls killed, which we took on board. Further on, we overtook a large herd of cows in the middle of the river, and had the engine not been stopped, we would have run them down; but as it was, all, even the calves escaped, with no other harm than a very great fright.

The banks thus far on this bend have been Mauvaise Terre. We had to-day for lunch, one of the dainties of this country — the milk gut of a buffalo roasted on coals. It tastes somewhat like white pudding, having in it a substance that when cooked has also the appearance of stuffing. Mr. Picotte in speaking of the dislike persons in the States have to such things, says, that in the north, the dung of the reindeer is eaten and very much relished, and that he himself has eaten it; it is esteemed because of a peculiar weed eaten very much by the animals and is taken out of them before being completely digested.

Evening. — Have traveled finely to-day; river continues rising; banks, prairie and bad lands; passed Knife river about noon, and this evening White river, which is about fifty miles from the British dominions, and said by some to be the most northern point of the river. We shall reach Fort Union probably on Sunday.

Saturday, June 15. — Last night we landed early, because of heavy clouds in the west, threatening a severe storm of wind and rain; it rained all night, but the storm was by no means as severe as it threatened to be.

THE

ANIMAL KINGDOM

ARRANGED IN CONFORMITY WITH ITS
ORGANIZATION,

BY THE BARON CUVIER,

MEMBER OF THE INSTITUTE OF FRANCE, &c. &c.

WITH

ADDITIONAL DESCRIPTIONS

OF

ALL THE SPECIES HITHERTO NAMED, AND OF
MANY NOT BEFORE NOTICED,

BY

EDWARD GRIFFITH, F.L.S., A.S., &c.
AND OTHERS.

VOLUME THE FIRST.

LONDON:

PRINTED FOR GEO. B. WHITTAKER,
AVE-MARIA-LANE.

MDCCCXXVII.

86-87

CLASS MAMMALIA.

ness of locomotion he is much inferior to other animals of not greater dimensions. He has neither projecting jaws, nor protruding canine teeth, nor nails extended into claws or talons, and is consequently destitute of offensive weapons. He is also almost without defensive arms, as the sides and upper part of his body are literally naked, not being furnished even with a covering of hair. Above all, he is the longest of all living beings in arriving at the full maturity and entire possession of all his faculties and energies, or even in acquiring sufficient force for his own preservation, subsistence and defence.

But he derives additional strength from his very weakness. His external deficiencies oblige him to look within, and to have recourse to that intelligence with which nature has endowed him in so eminent a degree.

No quadruped is comparable to man for the magnitude of the hemispheres of the brain, that is, of the part of this organ which serves as the principal instrument of the intellectual operations. The hinder part of the same organ extends so as to form a second covering for the cerebellum. The very form of the cranium announces this magnitude of the brain, while the comparative smallness of the face displays how little that part of the nervous system which influences the external senses is predominant in the human species.

These external sensations which are less energetic

in man than in some other animals, are nevertheless very delicate, and are admirably balanced among themselves.

His eyes are directed forwards: thus, though he does not see on both sides at once like most quadrupeds, yet, is there a great unity in the result of the visual operation, and the attention is concentrated more effectually on sensations of this kind. The globe and the iris of the eye possess little variation, and this restrains the sphere of vision to a determined distance, and a fixed degree of light.

The couch of his ear, possessing but little mobility or extent, does not enervate the intensity of sounds, yet of all animals he can best distinguish the various degrees of intonation. His nostrils, more complicated than those of apes, are less so than those of other animals, yet he appears to be the only living creature whose sense of smell is sufficiently delicate to be affected by unpleasant odours. The delicacy of the smell must have some influence on that of taste, but independently of that, man must possess considerable advantages in this respect, at least, over those animals whose tongues are covered with scales. Lastly, the perfection of his tact results both from the delicacy of his external tegument, the absence of all insensible parts, and the form of his hand so admirably constructed to adapt itself to all the slightest inequalities of surface.

Man possesses a most distinguished pre-eminence in the organs of his voice; he alone can produce articulate sounds. The form of his mouth and

ZOOLOGY

OF
NEW-YORK

THE

NEW-YORK MANA;

CONTAINING DETAILED DESCRIPTIONS OF ALL THE ANIMALS HERETO OBSERVED WITHIN THE STATE OF NEW-YORK, WITH BRIEF NOTICES OF THOSE OCCASIONALLY FOUND NEARER BY APPROPRIATE LITERATURE.

BY JAMES R. REED, M.D.

PART III.
REPTILES AND AMPHIBIA.

ALBANY: J. VISSEGER.
PRINTED BY W. & A. WHITE.
1832.

THE SNAPPING TURTLE.

CHOLONURA SERPENTINA.

9

Color. Dusky brown or olivaceous green above. The sternum, under side of the marginal plates, and of the neck, feet and tail, bright yellow, which becomes dull with age. Eyes brown. In a specimen from Lake Janet, Hamilton county, the under sides of the marginal plates were of a beautiful light green.

Total length, 12.0 - 48.0.
Ditto of tail, 4.0 - 16.0.

This is one of our largest turtles. It is common in every part of the State, and inhabits equally the clearest and muddiest streams. It is occasionally met with at a distance from the water, probably in search of food, or of a suitable place of deposit for its eggs. On the Raquet river, Franklin county, I found them laying their eggs in June, and we were frequently indebted to these deposits for a precarious meal. They scoop out a hole in the sand a short distance from the water, a few inches deep; and by probing with a short stick in places indicated by the tracks of the animal, we frequently obtained as many as sixty or seventy eggs from one spot. The eggs, as well as the animal, afford a very nutritious and savory food. The larger and older animals have a strong musky flavor, which renders them unpalatable. They feed upon frogs and fishes, and snap greedily at ducks in ponds, dragging them under water to be devoured at leisure. It is this propensity to snap at every thing within its reach, which has obtained for it its popular name. In other sections, it is known under the names of *Loggerhead*, *Alligator Turtle* and *Couta*. I have frequently observed a small leech (*Clepsina scabra*) adhering to it.

This species appears to extend over the whole Union, but its precise geographical limits are not yet ascertained.

10

THE SALT-WATER TERRAPIN.

EMYS PALUSTRIS.

Color. Usually of a dull ash brown above, varying in intensity in different individuals, sometimes approaching to black. Beneath, reddish or orange, occasionally pale and dull yellowish, with dusky dashes and rings on the sternal plates and lower side of the marginal plates. Head, neck and extremities dull bluish ash, with numerous spots of black.

Length, 5.0 - 7.0.
Height, 1.0 - 2.5.

11

This species is the well known and justly prized Terrapin of epicures. It is well distinguished as the Salt-water Terrapin, for it is found exclusively in salt or brackish streams near the seashore. They bury themselves in the mud during the winter, from which they are taken in great numbers, and are then very fat.

The geographical limits of this species extend from the Gulf of Mexico, along the Atlantic, to New-York. They are found along the northern shores of Long Island to its extremity, but I am not informed whether it occurs on the opposite main shore. Dr. Storer does not mention it in his valuable Report on the Reptiles of Massachusetts. The Prince of Canino has introduced this species into Italy, but I have not learned with what success.

THE SMOOTH TERRAPIN.

EMYS TERRAPIN.

Characteristics. Shell smooth, not sculptured with concentric marks; posterior vertebral plate regularly pentagonal. Length 5·0 - 7·0.

Description. In the skull, the occipital process is more slender and longer than in the preceding. No striking differences are observable in the shell, except that it is never so much carinated as in the preceding species, and it has only a few concentric striae on the lateral plates; the last vertebral plate distinctly pentagonal.

Color. Shell grey, with black concentric marks on each plate. Skin grey, speckled, and spotted with black.

I am indebted to Major Le Conte for a figure and note, pointing out the distinctive marks between this and the preceding species, which had been confounded by Daudin, and not distinguished by subsequent observers. They are both brought to our markets at the same time, and sold under the common name of *terrapin*. The specimens of the two species of the same size, examined by Major Le Conte, were both females. I had noticed the two, and supposed them to be sexual varieties. The market people say that they are caught in the same localities; but as Schœpff derived his specimens (the present species) from Mühlenberg, I am inclined to believe that the *T* (terrapin inhabits indifferently fresh and salt water.) Schœpff himself found one on Long Island, in water which was almost fresh.

The figure and description of the *Emys terrapin* of my friend Dr. Holbrook, clearly point out this species. His specimens are obscurely carinate on the vertebral line, and he is entirely silent respecting the deep concentric marks which distinguish the other species. According to Holbrook, this species occurs as far east as Rhode-Island.

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THE PAINTED TORTOISE.

EMYS PICTA.

Total length, 5·0 - 6·5.

Height, 2·0.

For the variety and beauty of its markings, this is unquestionably the handsomest of our fresh-water species. It is a timid, inoffensive animal, and dies in a few days when kept out of the water. It feeds on insects and the smaller aquatic reptiles, and also eats the leaves of the *Alisma plantago*, or water plantain. It is found in every part of the State, and next to the *Guttata* or Spotted Tortoise, is the most common, preferring tranquil ponds of water to clear

running streams. Although occasionally eaten, it is not much esteemed. It ranges from Canada to Georgia along the coast, and has been observed near Lake Superior. It is enumerated by Kirtland among the Reptiles of Ohio.

THE SPOTTED TORTOISE.

EMYS GUTTATA.

14

Length of the shell, 4·0 - 5·0.

Ditto of the tail, 1·0 - 1·3.

This is one of our most common tortoises, and offers great varieties in the distribution of its spots. Most generally the lateral plates have but a single spot on each. They vary also exceedingly in the convexity of the shell. Under the name of *Speckled Turtle*, this little animal is found throughout the Union. It inhabits streams and ponds, giving a preference to such as have a deep muddy bottom. On a warm day, they may be seen on a log or rock, closely huddled together, and basking in the sun; from this they slip suddenly into the water, on the approach of man. They feed on insects, frogs and worms; and bury themselves, on the approach of winter, in the mud at the bottom of ponds. It is rare in the Western States.

THE WOOD TERRAPIN.

EMYS INSCULPTA.

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Total length, 11·0.

Length of the tail, ... 1·6.

Length of the shell, .. 6·5.

Height of the shell, .. 2·7.

This is not one of the largest dimensions. Mr. Say speaks of one of which the shell was nine inches long, and I have heard of another which measured twelve inches.

We are indebted to Major Le Conte for the first elimination of this species. It is not so exclusively aquatic as most of its congeners, for it is frequently met with in woods at some distance from the water: hence one of its popular names. It is also called the *Fresh-water Terrapin*, to distinguish it from the *E. palustris* before described, and which it is thought to resemble in flavor. It is a northern species, extending from near Canada to Pennsylvania.

I observed it along the banks of the Raquet and Saranac rivers, in the northern part of the State. In one specimen 8·0 long, the caudal plates were serrated on their posterior margin by the extension of the deep angular impressed lines; the lateral plates were hollowed in their centres; neck furnished with warts; color dark greenish, with interrupted radiating yellow lines; throat and lower side of the legs bright orange. In another, found on a sand beach of Cedar river, one of the sources of the Hudson, with a shell 8·5 long, it was more convex, although the vertebral plates were more depressed, and the keel nearly effaced: the sutures were wide, and the plates elevated at the sutures. It is a harmless species; but when irritated, it will snap repeatedly at the offender. Little is known of its habits.

THE COMMON BOX TORTOISE.

CISTUDA CAROLINA.

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Length of shell, 6.0.
 Breadth, 4.0.
 Height, 2.5.

This beautiful species, which is designated in this State under the names of *Box Tortoise* and *Land Turtle*, and in the west by the name of *Lock Tortoise*, is a very gentle and timid animal. It varies so much in its colors, that it is difficult to find any two alike. Major Le Conte has a series of drawings, exhibiting many remarkable varieties in color: One was of a uniform black; and from this to the brilliant colored individual figured in the plate, a regular transition could be traced. He has enumerated five varieties, but they are almost innumerable. In common with many observers, I had considered the angular and concentric striae on the plates as constant characters. I have lately seen (May 1) a specimen, apparently of an adult, measuring six inches, in which the thin corneous laminae covering the plates were gradually dropping off, or shed; leaving the new epidermis completely smooth beneath, with colors of renewed brilliancy, while the old laminae were dull and strongly corrugated. How often does this desquamation occur? Is it the effect of disease, or is it an annual or periodical process? In this case, the desquamation was confined to the two middle dorsal, and to two lateral plates on one side, and to three on the other. The sutures between the plates, which had not desquamated, were of that deep character usually supposed to designate old age; but at the places where the desquamation had occurred, the sutures were as narrow and as little profound as in young individuals.

The Box Tortoise is common every where on dry land, although it is also occasionally met with in swamps and moist places. It never takes to the water from choice, and indeed would be drowned if retained there. It is frequently kept in cellars, under the notion that it drives away or destroys rats and other domestic vermin. One which I kept in my cellar, was found in the spring, eaten up by the rats. It feeds on insects, fruit, and the edible mushrooms. Its geographical range appears to be from Canada to Florida. It is rare in Ohio. In this latitude, it usually goes into winter quarters in the latter part of September.

BLANDING'S BOX TORTOISE.

CISTUDA BLANDINGII.

PLATE I. FIG. 2.

Cistuda blandingii. HOLBROOK, N. Am. Herpetol. Vol. 3, p. 34, pl. 5; and Vol. 1, pl. 39, pl. 3 of 2d Ed.
Blanding's Cistuda. STORER, Massachusetts Report, p. 215.

Characteristics. Shell less elevated than the preceding, ecarinate; margin entire. Sternum emarginate behind. Lower jaw hooked. Length 7-8 inches.

Description. Shell smooth, ecarinate. The first vertebral plate pentagonal; the second and

third, hexagonal; the fourth with seven sides, the last octagonal. Anterior and posterior lateral plates four-sided, rounded beneath; the second and third, pentagonal. Marginal plates twenty-five, with an interrupted margin; the intermediate small; the first, third, fourth, sixth, eighth, tenth and twelfth plates quadrilateral; the second, fifth, seventh and ninth, pentagonal: all are smooth in their centres, with indistinct concentric striae near their borders. Sternum

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num bivalve, of twelve plates, full and rounded in front, deeply emarginate behind, and when closed entirely conceal the animal. Head moderate. Nostrils anterior, contiguous. Eyes large, prominent. Upper jaw broad, with its cutting edge sharp, and deeply emarginate in front. Lower jaw with a small hook. Neck long, and slightly contracted behind the head. Fore legs robust, with imbricated scales in front, and smaller ones behind. Toes palmated, with five short curved claws. Hind legs covered with small scales and granulations, and furnished with five short curved claws, the posterior clawless.

Color. Shell jet black, marked with numerous oblong and round yellow spots. Sternum dusky yellow; each plate with a large quadrangular dark blotch at its outer posterior angle. Head black, with oblong yellow spots. Lower jaw and chin bright yellow. Throat yellow, but clouded with dusky. Fore legs olive yellow in front; dusky, with yellow spots behind. Hind legs dusky above, and soiled yellowish behind. Tail black above, with two obscure yellowish lines; dusky beneath.

Length of shell, 7.0-8.0.

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This species, which has been hitherto doubtless taken for a mere variety of the *C. carolina*, was first accurately described and figured by Dr. Holbrook in the work cited above. It was obtained by him from the prairies of Illinois and Wisconsin, and for some time this was the only locality. More recently it has been detected by Dr. Storer as far north as Haverhill, New-Hampshire, in 44° north latitude. It ranges unquestionably through all the northern and middle States; and hence, although not yet actually observed, must necessarily be included in our list of the Reptiles of New-York.

(EXTRA-LIMITAL.)

Genus *TURTUDO*, *Brongniart*. Shell solid. Sternum solid, immovable. Extremities short, thick and clavate. Toes short, and closely connected as far as the nails.

T. carolina. (HOLBROOK, Herp. pl. 1.) Shell very convex, depressed above; the last two marginal plates united; scapular plates projecting forward in a spade-like process. Tail very short. Length 12 inches. *Georgia, Florida*.

HISTORICAL AND CRITICAL ESSAYS.

BY

THOMAS DE QUINCEY,

AUTHOR OF

'CONFESSIONS OF AN ENGLISH OPIUM-EATER,' ETC. ETC.

IN TWO VOLUMES.

VOL. I.

BOSTON:

TICKNOR, REED, AND FIELDS.

MDCCCLIII.

119 PHILOSOPHY OF HERODOTUS.

Few, even amongst literary people, are aware of the true place occupied by Herodotus in universal literature; secondly, scarce here and there a scholar up and down a century is led to reflect upon the *multiplicity* of his relations to the whole range of civilization. We endeavor in these words to catch, as in a net, the gross prominent faults of his appreciation; on which account, first, we say pointedly, *universal* literature, not Grecian—since the primary error is, to regard Herodotus merely in relation to the literature of Greece; secondly, on which account we notice the circuit, the numerical amount, of his collisions with science—because the second and greater error is, to regard him exclusively as an historian.

But now, under a juster allocation of his rank, as the general father of prose composition, Herodotus is nearly related to all literature whatsoever, modern not less than ancient; and as the father of what may be called ethnographical geography, as a man who speculated most ably on all the *humanities* of science—that is, on all the scientific questions which naturally interest our human sensibilities in this great temple

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which we look up to, the pavilion of the sky, the sun, the moon, the atmosphere, with its climates and its winds; or in this home which we inherit, the earth, with its hills and rivers—Herodotus ought least of all to be classed amongst historians: that is but a secondary title for *him*; he deserves to be rated as the leader amongst philosophical polyhistor, which is the nearest designation to that of encyclopædist current in the Greek literature. And yet is not this word *encyclopadist* much lower than his ancient name—*father of history*? Doubtless it is no great distinction *at present* to be an encyclopædist, which is often but another name for bookmaker, craftsman, mechanic, journeyman, in his meanest degeneration; yet in those early days, when the timid muse of science had scarcely ventured scandal deep into waters so unfathomable, it seems to us a great thing indeed, that one young man should have founded an entire encyclopædia for his countrymen, upon those difficult problems which challenged their primary attention, because starting forward from the very roof—the walls—the floor of that beautiful theatre which they tenanted. The habitable world, *ἡ οἰκουμένη*, was now daily becoming better known to the human race; but how? Chiefly through Herodotus. There are

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Nor was it in the facts merely, that he retraced the portraits of all leading states; whatsoever in these facts was mysterious, for that he had a self-originated solution; whatsoever was perplexing by equiponderant counter-assumptions, for that he brought a determining impulse to the one side or the other; whatsoever seemed contradictory, for that he brought a reconciling hypothesis. Were it the annual rise of a river, were it the formation of a famous kingdom by alluvial depositions, were it the unexpected event of a battle, or the apparently capricious migration of a people—for all alike Herodotus had such resources of knowledge as took the sting out of the marvellous, or such resources of ability as at least suggested the plausible. Antiquities or mythology, martial institutions or pastoral, the secret motives to a falsehood which he exposes, or the hidden nature of some truth which he deciphers—all alike lay within the searching dissection of this astonishing intellect, the most powerful lens by far that has ever been brought to bear upon the mixed objects of a speculative traveller.

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The substantive is a word frequently employed by Herodotus: often in the plural number; and uniformly it means *inquiries* or *investigations*; so that the proper English version of the title-page would be—'Of the *Researches* made by Herodotus, Nine Books.' And, in reality, that is the very meaning, and the secret drift, the conservation running overhead through these nine sections to the nine muses. Had the work been designed as chiefly historical, it would have been placed under the patronage of the one sole muse presiding over History.

Once, and in a public situation, we ourselves denominated Herodotus the Froissart of antiquity. But we were then speaking of him exclusively as an historian; and even so, we did him injustice. Thus far it is true the two men agree, that both are less political, or reflecting, or moralizing, as historians, than they are scenical and splendidly picturesque. But Froissart is little else than an historian. Whereas Herodotus is the counterpart of some ideal Pandora, by the universality of his accomplishments. He is a

traveller of discovery, like Captain Cook or Park. He is a naturalist, the earliest that existed. He is a mythologist, and a speculator on the origin, as well as value, of religious rites. He is a political economist by instinct of genius, before the science of economy

had a name or a conscious function; and by two great records, he has put us up to the level of *all* that can excite our curiosity at that great era of moving civilization:

But take him as an exploratory traveller and as a naturalist, who had to break ground for the earliest entrenchments in these new functions of knowledge;

we do not scruple to say that *mutatis mutandis*, and *concessis concedendis*, Herodotus has the separate qualifications of the two men whom we would select by preference as the most distinguished amongst Christian traveller-naturalists; he has the universality of the Prussian Humboldt; and he has the picturesque fidelity to nature of the English Dampier — of whom the last was a simple self-educated seaman, but strong-minded by nature, austere accurate through his moral reverence for truth, and zealous in pursuit of knowledge, to an excess which raises him to a level with the noble Greek. Dampier, when in the last stage of exhaustion from a malignant dysentery, unable to stand upright, and surrounded by perils in a land of infidel fanatics, crawled on his hands and feet to verify some fact of natural history, under the blazing forenoon of the tropics; and Herodotus, having no motive but his own inexhaustible thirst of knowledge, embarked on a separate voyage, fraught with hardships, towards a chance of clearing up what seemed a difficulty of some importance in deducing the religious mythology of his country.

I. — *The Non-Planetary Earth of Herodotus in its relation to the Planetary Sun.*

Mr. Hermann Bobrik is the first torch-bearer to Herodotus, who has thrown a strong light on his theory of the earth's relation to the solar system. This is one of the *præcognita*, literally indispensable to the compre-

hension of the geographical basis assumed by Herodotus. And it is really interesting to see how one original error had drawn after it a train of others — how

one restoration of light has now illuminated a whole hemisphere of objects. We suppose it the very next

thing to a fatal impossibility, that any man should at once rid his mind so profoundly of all natural biases from education, or almost from human instinct, as barely to suspect the physical theory of Herodotus — barely to imagine the idea of a divorce occurring in any theory between the solar orb and the great phenomena of summer and winter. Prejudications, having

the force of a necessity, had blinded generation after generation of students to the very admission in *limine* of such a theory as could go the length of dethroning the sun himself from all influence over the great vicissitudes of heat and cold — seed-time and harvest — for man. They did not see what actually *was*, what lay broadly below their eyes, in Herodotus, because it seemed too fantastic a dream to suppose that it *could* be. The case is far more common than feeble psychologists imagine. Numerous are the instances in which we actually see — not that which is really there to be seen — but that which we believe *a priori* ought to be there. And in cases so palpable as that of an external sense, it is not difficult to set the student on his guard. But in cases more intellectual or moral, like several in Herodotus, it is difficult for the teacher himself to be effectually vigilant. It was not anything actually seen by Herodotus which led him into denying the solar functions; it was his own independent speculation.

For Herodotus, there existed two great counter-forces in absolute hostility — heat and cold; and these forces were incarnated in the winds. It was the north and north-east wind, not any distance of the sun, which radiated cold and frost; it was the southern wind from Ethiopia, not at all the sun, which radiated heat. But could a man so sagacious as Herodotus stand with his ample Grecian forehead exposed to the noonday sun, and suspect no part of the calorific agency to be seated in the sun? Certainly he could not. But this partial agency is no more than what we of this day allow to secondary or tertiary causes apart from the principal. We, that regard the sun as upon the whole our planetary fountain of light, yet recognise an electrical *aurora*, a zodiacal light, &c., as substitutes not palpably dependent. We that regard the sun as upon the whole our fountain of heat, yet recognise many co-operative, many modifying forces having the same office — such as the local configuration of ground — such as sea neighborhoods or land neighborhoods, marshes or none, forests or none, strata of soil fitted to retain heat and fund it, or to disperse it and cool it. Precisely in the same way Herodotus did

allow an agency to the sun upon the *daily* range of heat, though he allowed none to the same luminary in regulating the *annual* range. What caused the spring and autumn, the summer and winter, (though generally in those ages there were but two seasons recognised,) was the action of the winds. The diurnal arch of heat (as we may call it) ascending from sunrise to some hour, (say two P. M.) when the sum of the two heats

(the funded annual heat and the fresh increments of *daily* heat) reaches its *maximum*, and the descending limb of the same arch from this hour to sunset — this he explained entirely out of the sun's *daily* revolution, which to him was, of course, no apparent motion, but a real one in the sun. It is truly amusing to hear the great man's infantine simplicity in describing the effects of the solar journey. The sun rises, it seems, in India; and these poor Indians, roasted by whole nations at breakfast-time, are then up to their chins in water, whilst we thankless Westerns are taking 'tea and toast' at our ease. However, it is a long lane which has no turning; and by noon the sun has driven so many stages away from India, that the poor creatures begin to come out of their rivers, and really find things tolerably comfortable. India is now cooled down to a balmy Grecian temperature. 'All right behind!' as the mail-coach guards observe; but not quite right ahead, when the sun is racing away over the boiling brains of the Ethiopians, Libyans, &c., and driving Jupiter-Ammon perfectly distracted with his furnace. But when things are at the worst, the proverb assures us that they will mend. And for an early five o'clock dinner, Ethiopia finds that she has no great reason to complain. All civilized people are now cool and happy for the rest of the day. But, as to the woolly-headed rascals on the west coast of Africa, they 'catch it' towards sunset, and 'no mistake.' Yet why trouble our heads about inconsiderable black fellows like them, who have been cool all day whilst better men were melting away by pailfuls? And such is the history of a summer's day in the heavens above and

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on the earth beneath. As to little Greece, she is but skirted by the sun, who keeps away far to the south; thus she is maintained in a charming state of equilibrium by her fortunate position on the very frontier line of the fierce *Boreas* and the too voluptuous *Notos*.

Meantime one effect follows from this transfer of the solar functions to the winds, which has not been remarked, — viz. that Herodotus has a double north; one governed by the old noisy *Boreas*, another by the silent constellation *Arktos*. And the consequence of this fluctuating north, as might be guessed, is the want of any true north at all; for the two points of the wind and the constellation do not coincide in the first place; and secondly, the wind does not coincide with itself, but naturally traverses through a few points right and left. Next, the east also will be indeterminate from a different cause. Had Herodotus lived in a high northern latitude, there is no doubt that the ample range of difference between the northerly points of rising in the summer and the southerly in winter, would have forced his attention upon the fact, that only at the equinox, vernal or autumnal, does the sun's rising accurately coincide with the east. But in his Ionian climate, the deflexions either way, to the north or to the south, were too inconsiderable to force themselves upon the eye; and thus a more indeterminate east would arise — never rigorously corrected, because requiring so mode-

rate a correction. Now, a vague unsettled east, would support a vague unsettled north. And of course, through whatever arch of variations either of these points vibrated, precisely upon that scale the west and the south would follow them.

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II. — The Danube of Herodotus considered as a counterpole to the Nile.

There is nothing more perplexing to some of the many commentators on Herodotus than all which he says of the river Danube; nor anything easier, under the preparation of the preceding article. The Danube, or, in the nomenclature of Herodotus, the *Istros*, is described as being in all respects *εξ ακαλλήλου*, by which we must understand corresponding rigorously, but antistrophically, (as the Greeks express it,) similar angles, similar dimensions, but in an inverse order, to the Egyptian Nile. The Nile, in its monstrous section, flows from south to north. Consequently the Danube, by the rule of *parallelism*, ought to flow through a corresponding section from north to south. But, say the commentators, it does *not*. Now, verbally they might seem wrong; but substantially, as regards the justification of Herodotus, they are right. Our business, however, is not to justify Herodotus, but to explain him. Undoubtedly there is a point about one hundred and fifty miles east of Vienna, where the Danube descends

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almost due south for a space of three hundred miles; and this is a very memorable reach of the river; for somewhere within that long corridor of land which lies between itself, (this Danube section,) and a direct parallel section equally long, of the Hungarian river Theiss, once lay, in the fifth century, the royal city or encampment of Attila.

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This construction it was of the Danube's course which subsequently, upon his hearing of a corresponding western limb for the Nile, led him to perceive the completion of that analogy between the two rivers, its absolute perfection, which already he had partially suspected. Their very figurations now appeared to reflect and repeat each other in solemn mimicry, as previously he had discovered the mimical correspondence of their functions; for this latter doctrine had been revealed to him by the Egyptian priests, then the chief depositaries of Egyptian learning. They had informed him, and evidently had persuaded him, that already more than once the sun had gone round to the region of Europe; pursuing his diurnal arch as far to the north of Greece as now he did to the south; and carrying in his equipage all the changes of every kind which were required to make Scythia an Egypt, and consequently to make the *Istros* a Nile. The same annual swelling then filled the channel of the Danube, which at present gladdens the Nile. The same luxuriance of vegetation succeeded as a dowry to the gay summer-land of Trans-Euxine and Para-Danubian Europe, which for

thousands of years had seemed the peculiar heirloom of Egypt.

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III.—On the Africa of Herodotus.

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Here there is no real difficulty; for the arguments of Herodotus are of two separate classes, and both too strong to leave any doubt that his private opinion never varied by a hair's breadth on this question. And it was a question far from verbal, of which any man may convince himself by reflecting on the disputes, at different periods, with regard to Macedon (both *Macedonis* the original germ, and *Macedonia* the expanded kingdom) as a claimant of co-membership in the household of Greece; or on the disputes, more angry if less scornful, between Carthage and Cyrene as to the true limits between the daughter of Tyre and the daughter of Greece. The very color of the soil in Egypt—the rich black loam, precipitated by the creative river—already symbolized to Herodotus the deep repulsion lying between Egypt on the one side, and Libya, where all was red; between Egypt on the one side, and Asia, where all was calcined into white sand. And, as to the name, does not the reader catch *us* still using the word 'Africa' instead of Libya, after all our sparring against that word as scarcely known by possibility to Herodotus?

But, beyond this controversy as to the true marches or frontier lines of the two great continents in common—Asia and Africa—there was another and a more grave one as to the size, shape and limitations of Africa in particular. It is true that both Europe and Asia were imperfectly defined for Herodotus. But he fancied otherwise; for them he could trace a vague, rambling outline. Not so for Africa, unless a

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great event in Egyptian records were adopted for true. This was the voyage of circumnavigation accomplished under the orders of Pharaoh Necho. Disallowing this earliest recorded *Periplus*, then no man could say of Africa whether it were a large island or a boundless continent having no outline traceable by man, for (which, doubtless, would have been the favorite creed) whether it were not a technical *akté* such as Asia Minor; that is, not a peninsula like the Peloponnesus, or the tongues of land near Mount Athos—because in that case the idea required a narrow neck or isthmus at the point of junction with the adjacent continent—but a square, tabular plate of ground, 'a block of ground' (as the Americans say) having three sides washed by some sea, but a fourth side absolutely untouched by any sea whatever. On this word *akté*, as a term but recently drawn out of obscurity, we shall say a word or two further on; at present we proceed with the great African *Periplus*. We, like the rest of this world, held this to be a pure fable, so long as we had never anxiously studied the ancient geography, and consequently had never meditated on the circumstances of this story under the

light of that geography, or of the current astronomy. But we have since greatly changed our opinion. And, though it would not have shaken that opinion to find Rennell dissenting, undoubtedly it much strengthened our opinion to find so cautious a judge concurring. Perhaps the very strongest argument in favor of the voyage, if we speak of any *single* argument, is that which Rennell insists on—namely, the sole circumstance reported by the voyagers which Herodotus

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pronounced incredible, the assertion that in one part of it they had the sun on the right hand. And as we have always found young students at a loss for the meaning of that expression, since naturally it struck them that a man might bring the sun at any place on either hand, or on neither, we will stop for one moment to explain, for the use of such readers and ladies, that, as in military descriptions, you are always presumed to look *down* the current of a river, so that the 'right' bank of the Rhine, for instance, is *always* to a soldier the German bank, the 'left' *always* the French bank, in contempt of the traveller's position; so, in speaking of the sun, you are presumed to place your back to the east, and to accompany him on his daily route. In that position, it will be impossible for a man in our latitudes to bring the sun on his *right* shoulder, since the sun never even rises to be vertically over his head.

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But the questions are endless which grow out of Herodotus. Pliny's Natural History has been usually thought the greatest treasure-house of ancient learning. But we hold that Herodotus furnishes by much the largest basis for vast commentaries revealing the archæologies of the human race: whilst, as the eldest of prose writers, he justifies his majestic station as a brotherly assessor on the same throne with Homer.



SYLVA,

Or a DISCOURSE of

FOREST-TREES,
AND THE
PROPAGATION of TIMBER

In His MAJESTIES Dominions.

As it was Deliver'd in the *ROYAL SOCIETY* the xvth of *October*,
MDCLXII. upon occasion of certain *Queries* propounded to that *Illustri-*
ous Assembly, by the *Honorable* the *Principal Officers*, and *Commissioners* of the *Navy*.

TERRA,

A

Philosophical Essay of *EARTH*, being a *Lecture* in *Course*.

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Appendix concerning *Fruit-Trees* in relation to *CIDER*;
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Ingredior, tantos ausus recludere fonteis. Virg.

LONDON,

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which minds me of a certain *Oak* found buried somewhere in *Transilvania*, near the *Salt-pits*, that was intirely converted into an hard *salt*, when they came to examine it by cutting. This *experiment* (if true) may possibly encourage some other attempts for the multiplying of *Salt*. Of the *Galls* is made the ground and *basis* of *Inks* and several *Dyes*, especially sadder colours, and are a great *r  venue* to those who have quantities of them. The very *Moss* of the *Oak*, viz. that which is *white*, composes the choicest *Cypress-powder*, which is esteemed good for the head: but *Impos-*
tors familiarly vend other *Mosses* under that name, as they do the *Fungi* for the true *Agaric*, to the great scandal of *Physick*. Young red *Oaken* leaves decocted in *wine*, make an excellent *gargle* for a fore *mouth*; and almost every part of this *Tree* is sovereign against *Fluxes* in general. The *dew* that impearls the leaves in *May*, insolated, meteorizes and sends up a *liquor*, which is of admirable effect in *Ruptures*: And a *water* distill'd from the *Acorns* is good against the *Phthisick*, *Stitch* in the side, and heal inward *Ulcers*, breaks the *Stone*, and refrigerates *Inflammations*, being applied with *Linnen* dip'd therein: nay, the *Acorns* themselves eaten fasting, kill the *worms*, provoke *urine*, and (some affirm) break even the *Stone* it self. The *Coals* of *Oak* beaten and mingled with *honey*, cures the *Carbuncle*; to say nothing of the *Viscus's*, *Polypods*, and other *Excrescences*, of which innumerable *Remedies* are composed, noble *Antidotes*, *Syrups*, &c. Nay, 'tis reported, that the very shade of this tree is so wholesome, that the *sleeping*, or lying under it becomes a present *remedy* to *Paralyticks*; and recovers those whom the mistaken malign influence of the *Walnut-tree* has smitten: nay I read in one *Paulus* a *Physician* of *Denmark*, That an handful or two of small *Oak* buttons, mingled with *Oats*, given to *Horses* which are black of colour, will in few days eating alter it to a fine *Dapple-grey*, which he attributes to the *Vitriol* abounding in this *Tree*.

But the shade of the *Ash* is not to be endur'd, because it produces a noxious *Insect*; and for displaying themselves so very late, and falling very early, not to be wanted for *Umbrage*, or *Ornament*; especially near the *Garden*, since (besides their predatitious *Roots*) the deciduous leaves dropping with so long a *Stalk*, are drawn by clusters into the *Worm* holes, which foul the *Allies* with their falling *Keys*, and suddenly infect the ground. Note, that the *Season* for *felling* of this *Tree* must be when the *Sap* is fully at rest; for if you cut it down too early, or over late in the year, it will be so obnoxious to the *Worm*, as greatly to prejudice the *timber*; therefore to be sure, fell not till the three *Mid-winter* Months, beginning about *November*: But in

Lopping of Pollards (as of *soft Woods*) Mr. *Cook* advises it should be towards the *Spring*, and that you do not suffer the *Lops* to grow too great: Also, that so soon as a *Pollard* comes to be considerably *hollow* at the *head*, you suddenly cut it down, the *body* decaying more than the head is worth: the same he pronounces of taller *Ashes*, and where the *Wood-peckers* make holes (who constantly indicate their being faulty.) to fell it in the *Winter*. I am astonish'd at the universal Confidence of all our *Botanists*, that a *Serpent* will rather creep into the *Fire*, than over a twig of *Ash*; this is an old *Imposture* of *Plinys*, who either took it up upon trust, or we mistake the *Tree*.

Chap. XVII.

A Discourse of Forest-Trees.

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5. The use of the *Hasel* is for *Poles*, *Spars*, *Hoops*, *Forks*, *Angling-rods*, *Faggots*, *Gudgels*, *Coals*, and *Springes* to catch birds; and it makes one of the best *Coals*, once us'd for *Gun-powder*, being very fine and Light, till they found *Alder* to be more fit: There is no Wood which purifies *Wine* sooner, than the *Chips* of *Hasel*: Also for *With's* and *Bands*, upon which, I remember *Pliny* thinks it a pretty *Speculation*, that a Wood should be stronger to bind withal, being *bruise'd* and *divided*, than when *whole* and *entire*; The *Coals* are us'd by *Painters*, to draw with like those of *Sallow*: lastly, for Riding *Switches*, and *Divinatory Rods* for the detecting, and finding-out of *Minerals*; at least, if that *Tradition* be no *imposture*. But the most signal Honour it was ever employ'd in, and which might deservedly exalt this humble, and common *Plant* above all the *Trees* of the *Wood*, is that of *Hurdles*; not for that it is generally us'd for the Folding of our Innocent *Sheep*; an Emblem of the *Church*; but for making the *Walls* of one of the first *Christian Oratories* in the World; and particularly in this *Island*, that venerable, and Sacred *Fabrick* at *Glasenbury*, founded by *S. Joseph of Arimathea*, which is storied to have been first compos'd but of a few small *Hasel-Rods* interwoven about certain *Stakes* driven into the ground; and *Walls* of this kind, in stead of *Laths* and *Punchions*, superinduc'd with a course *Mortar* made of *loam* and *straw*, does to this day, inclose divers humble *Cottages*, *Sheads* and *Out-houses* in the Countrey; and 'tis strong, and lasting for such purposes, *whole*, or *cleft*, and I have seen ample enclosures of *Courts*, and *Gardens* so secur'd.

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Chap. XX.

16. To conclude, there is a way of *Graffing* a *Sallow* truncheon; take it of two foot and half long, as big as your *wrist*; Graff at both ends a *Figure*, and *Meiberry Cyon* of a foot long, and so, without *claying*, set the *Stock* so far into the ground, as the *Plant* may be three, or four inches above the Earth: This (some affirm) will thrive exceedingly the *first* year, and in *three*, be fit to *transf-*

plant. The season for this Curiosity is *February*. Of the *Sallow* is made the *Shoo-makers* carving or *Cutting-board*, as best to preserve the edge of their *knives*, for its equal softness every way.

17. *Oziers*; or the *Aquatic Salix*, are of innumerable kinds, commonly distinguish'd from *Sallows*, as *Sallows* are from *Withies*; being so much smaller than the *Sallows*, and shorter liv'd, and requiring more constant *moisture*, yet would be Planted in rather a *dryish* ground, than over *moist* and spewing, which we frequently cut Trenches to avert: It likewise yields more limber, and flexible *twigs* for *Baskets*, *Flaskets*, *Hampers*, *Cages*, *Lattices*, *Cradles*, the Bodies of *Coaches*, and *Wagons*, for which 'tis of excellent use, light, durable, and neat, as it may be wrought and cover'd: For *Chairs*, *Hurdles*, *Stays*, *Bands*, &c. likewise for *Fish Wairs*, and to support the *Banks* of impetuous *Rivers*: In fine, for all *Wicker*, and *Twiggie* works:

Viminibus Salices——

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Every *Acre* at eleven, or twelve years growth, may yield you near an *hundred Load* of *Wood*: Cut them in the *Spring* for dressing, but in the *Fall* for *Timber* and *Fuel*: I have been inform'd, that a *Gentleman* in *Essex*, has lopp'd no less than 2000 year's, all of his own planting. It is far the sweetest of all our *English Fuel*, provided it be sound and dry, and emitting little *Smoak*, is the fittest for *Ladies Chambers*; and all those *Woods*, and *Twigs* would be cut either to *Plant*, *Work* with, or *Burn* in the dryest time of the day.

27. There is a sort of *Willow* of a slender, and long Leaf, resembling the smaller *Ozier*; but rising to a Tree as big as the *Sallow*, full of *knots*, and of a very brittle *spray*, only here rehears'd to acknowledge the variety.

28. There is likewise the *Garden-willow*, which produces a sweet, and beautiful *flower*, fit to be admitted into our *Hortulan* ornaments, and may be set for *partitions* of *squares*; but they have no affinity with other.

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Pales are also made of cleft *Willow*, *Dorsers*, *Fruit-baskets*, *Canns*, *Hives* for *Bees*, *Trenchers*, *Trays*, and for polishing and whetting *Table-Knives*, the *Butler* will find it above any *Wood* or *Whet-stone*; also for *Coals* and *Bavin*, not forgetting the fresh *boughs*, which of all the Trees in nature, yield the most chaff, and coolest *shade* in the hottest season of the day; and this Umbrage so wholesome, that *Physicians* prescribe it to *Feaverish* persons, permitting them to be plac'd even about their *Beds*, as a safe, and comfortable *refrigerium*. The wood being preserv'd dry, will dure a very long time; but that which is found wholly *putrifi'd*, and reduc'd to a loamy earth in the hollow trunks of *superannuated* Trees, is, of all other, the fittest to be mingl'd with fine *mould*, for the raising our choicest *Flowers*, such as *Anemonies*, *Ranunculus's*,

Auriculas, and the like.

What would we more? low *Broom*, and *Sallows* wild,
Or feed the Flock, or Shepherds shade, or Field
Hedges about, or do us Hony yield.

*Quid majora sequor? Salices, humilesque genistæ,
Aut illæ pecoræ frondem, aut pastoribus umbram
Sufficiunt, sæpèque satis, & pabula melli.*

Georg. 2.

Chap. XXI. *A Discourse of Forest-Trees.* 93.

4. The *Hei-thorne*, (*Oxyacantha vulgaris*) and indeed the very best of common *hedges*, is either rais'd of *Seeds* or *Plants*; but then it must not be with *despair*, because sometimes you do not see them peep the *first* year; for the *Haw*, and many other *Seeds*, being invested with a very hard *Integument*, will now and then suffer *imprisonment* two whole years under the earth; and our impatience at this, does often frustrate the *resurrection* of divers *seeds* of this nature; so as we frequently *dig* up, and disturb the *beds* where they have been *sown*, in *despair*, before they have gone their *full time*; which is also the reason of a very *popular* mistake in other *Seeds*: Especially, that of the *Holly*, concerning which there goes a *tradition*; that they will not sprout till they be pass'd through the *Maw* of a *Thrush*; whence the saying, *Turdus exitium suum cacat* (alluding to the *Viscus* made thereof, not the *Mistletoe* of *Oak*) but this is an *error*, as I am able to testify on *experience*; they come up very well of the *Berries*, treated as I have shew'd in Chap. 26. and with *patience*; for (as I affirm'd) they will *sleep* sometimes *two* entire years in their *Graves*; as will also the seeds of *Yew*, *Sloes*, *Phillyrea angustifolia*, and sundry *others*, whose *shells* are very hard about the small *kernels*; but which is wonderfully facilitated, by being (as we directed) prepar'd in *beds*, and *Magazines* of *Earth*, or *Sand* for a competent time, and then committed to the ground before the *full* in *March*, by which *season* they will be *chitting*, and speedily take *Root*:

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13. That all these, especially the *Fir*, and *Pine*, will prosper well with us, is more than probable, because it is a kind of *Demonstration*, that they did heretofore grow plentifully in *Cumberland*, *Cheshire*, *Stafford*, and *Lancashire*, if the multitudes of these *Trees* to this day found intire, and buried under the *Earth*, though suppos'd to have been o'rethrown, and cover'd so ever since the universal *Deluge*, be indeed of this *Species*: The Learned Dr. *Merrett*, in his *Pinax*, speaks of several *places* of this *Nation*, where *subterraneous-Trees* are found; as namely, in *Cornwal*, *ad finem terræ*, in *agris Flints*; in *Penbroke-shire* towards the shore, where they so abound, *ut totum littus* (says the Doctor) *tanquam Sylva cædua appareat*;

For 'tis observ'd, that these *Trees* are no where found so frequently, as in *Boggie* places; but that the burning of these *Trees* so very bright, should be an *Argument* they

were *Fir*, is not necessary, since the *Bituminous* quality of such *Earth*, may have imparted it to them; and *Cambden* denies them to be *fir-trees*, suggesting the *Querie*; Whether there may not possibly grow *Trees* even under the *Ground*, as well as other things?

There are in *Cumberland*, on the *Sea-shore*, *Trees* sometimes discover'd at *Low-water*, and at other times that lye buried in the *Sand*; and in other *Mossie* places of that *County*, 'tis reported, the *People* frequently dig up the *Bodies* of vast *Trees* without *Boughs*, and that by direction of the *Dew* alone in *Summer*; for they

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observe it never lyes upon that part, under which those *Trees* are interr'd. These particulars I find noted by the Ingenious *Author* of the *Britannia Baconica*. How vast a *Forest*, and what goodly *Trees* were once standing in *Holland*, and those *Low-countries*, till about the *Year* 860, that an *Hurricane* obstructing the mouth of the *Rhine* near *Catwic*, made that horrid devastation, good *Authors* mention; and they to this day find monstrous bodies, and branches, (nay with the very *Nuts*, most intire) of prostrate, and buried *Trees*, in the *Veene*, especially towards the *South*, and at the bottom of the *Waters*:

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15. For the many, and almost universal use of these *Trees*, both *Sea* and *Land* will plead,

The useful *Pine* for Ships ———

——— dant utile Lignum
Navigis Pinos ———

Georg. 2.

Hence *Papinius* 6. *Thebaid.* calls it *andax abies*. They make our best *Mast*, *Sheathing*, *Scaffold-poles*, &c. heretofore the whole *Vessel*: It is pretty (saith *Pliny*) to consider, that those *Trees* which are so much sought after for *Shipping*, should most delight in the highest of *Mountains*, as if it fled from the *Sea* on purpose, and were afraid to descend into the *Waters*. With *Fir* we likewise make all intestine works, as *Wainscot*, *Floors*, *Pales*, *Balks*, *Laths*, *Boxes*, *Bellies* for all *Musical Instruments* in general, nay the *Ribs*, and *Sides* of that enormous *Stratagem*, the so famous *Trojan Horse*, may be thought to be built of this *Material*, and if the *Poet* mistake not,

— The *Ribs* with *Deal* they fit.

——— Sæclaque intexant Abiete costas.

Æn. 2.

In *Holland* they receive their best *Masts* out of *Normay*, and even as far as *Moscovy*, which are best esteemed, (as consisting of long *fibers*, without *knots*) but *Deal-boards* from the *first*; and though *Fir* rots quickly in *Salt-Water*, it does not so soon perish in *fresh*; nor do they yet refuse it in *Merchant-Ships*, especially the upper-parts of them, because of its lightness: The true *Pine* was ever highly commended by the *Antients* for *Naval Architecture*, as not so easily decaying; and we read that *Trajan* caus'd *Vessels* to be built both of the true, and *spurious* kind well pitch'd, and over-laid with *lead*, which perhaps might hint our

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16. But now whiles I am reciting the *Uses* of these beneficial Trees, Mr. *Winthorp* presents the *Royal Society* with the *Process* of making the *Tar*, and *Pitch* in *New-England*, which we thus abbreviate. *Tar* is made out of that sort of *Pine-tree*, from which naturally *Turpentine* extilleth; and which at its first flowing out, is liquid and clear; but being hardned by the *Air*, either on the *Tree*, or where-ever it falls, is not much unlike the *Burgundy Pitch*; and yve call them *Pitch-pines* out of which this gummy substance transudes: They grow upon the most barren plains, on *Rocks* also, and *Hills* rising amongst those *Plains*, where several are found blown down, that have lain so many *Ages*, as that the whole Bodies, Branches, and Roots of the Trees being perished, some certain *knots* only of the Boughs have been left remaining intire (these *knots* are that part where the *bough* is joyn'd to the *body* of the *Tree*) lying at the same distance and posture, as they grew upon the *Tree* for its whole length. The Bodies of some of these *Trees* are not corrupted through age, but quite consum'd, and reduc'd to ashes, by the annual *burnings* of the *Indians*; when they set their grounds on *fire*; which yet has, it seems, no power over these hard *knots*, beyond a black scorching; although being laid on heaps, they are apt enough to burn. It is of these *knots* they make their *Tar* in *New-England*, and the *Country* adjacent, whiles they are well impregnated with that *Terbinthine*, and *Resinous* matter, which like a *Balsom*, preserves them so long from *putrefaction*. The rest of the *Tree* does indeed contain the like *Terbinthine Sap*, as appears (upon any slight incision of *bark* on the stem, or boughs) by a small-crystalline pearl which will sweat out; but *this*, for being more watery, and undigested by reason of the *porosity* of the *Wood*, which exposes it to the impressions of the *Air* and *Wet*, renders the *Tree* more obnoxious; especially, if it lie prostrate with the *bark* on, which is a receptacle for a certain *Intercutaneous Worm*, that accelerates its decay. They

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are the *knots* then alone, which the *Tar-makers* amass in *heaps*, carrying them in *Carts* to some convenient place not far off, where finding *Clay*, or *Loam* fit for their turn, they lay an *Hearth* of such ordinary stone as they have at hand: This, they build to such an height from the level of the ground, that a *Vessel* may stand a little lower than the *Hearth*, to receive the *Tar* as it runs out: But first, the *Hearth* is made wide, according to the quantity of *knots* to be set at once, and that with a very smooth *floor* of *Clay*, yet somewhat descending, or dripping from the extream parts to the *middle*, and thence towards one of the *sides*, where a *gullet* is left for the *Tar* to run out at. The *Hearth* thus finish'd, they pile the *knots* one upon another, after the very same manner as our *Colliers* do their *wood* for *Char-coal*; and of a height proportionable to the breadth of the *Hearth*; and then cover them over with a coat of *loam*, or *clay* (which is best) or in defect of those, with the best, and most tenacious *Earth* the place will afford; leaving only a small *spira-*

cle at the top, whereat to put the *fire* in; and making some little *holes* round about at several heights, for the admission of so much *air*, as is requisite to keep it burning, and to regulate the *fire*, by opening, and stopping them at pleasure. The *process* is almost the same with that of making *Char-coal*, as will appear in due place; for, when it is well on *fire*, that middle *hole* is also stopp'd, and the rest of the *Registers* so govern'd, as the *knots* may keep burning, and not be suffocated with too much *smoak*; while all being now through-heated, the *Tar* runs down to the *Hearth*, together with some of the more watry *Sap*, which hasting from all *parts* towards the *middle*, is convey'd by the fore-mention'd *gutter*, into the *Barrel*, or *Vessel* placed to receive it: Thus, the whole *Art* of *Tar-making* is no other, than a kind of rude distillation *per descensum*, and might therefore be as well done in *Furnaces* of large capacity, were it worth the expence. When the *Tar* is now all melted out, and run, they stop up all the *vents* very close; and afterwards find the *knots* made into excellent *Char-coal*, prefer'd by the *Smiths* before any other whatsoever, which is made of wood; and nothing so apt to burn out when their *blast* ceaseth; neither do they sparkle in the *fire*, as many other sorts of *Coal* do; so as, in defect of *Sea-coal*, they make choice of *this*, as best for their use, and give greater *prices* for it. Of these *knots* likewise do the *Planters* split out small *slivers*, about the thickness of one's *finger*, or somewhat thinner, which serve them to burn in stead of *Candles*; giving a very good light. This they call *Candle-wood*, and it is in much use both in *New-England*, *Virginia*, and amongst the *Dutch planters* in their *Villages*; but for that it is something offensive, by reason of the much fuliginous *smoak* which comes from it, they commonly burn it in the *chimney-corner*, upon a flat *stone* or *Iron*; except, occasionally, they carry a single *stick* in their hand, as there is need of light to go about the house.

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LARCH

Tiberius we find built that famous *Bridge* to his *Namachia* with this *wood*, and it seems to excel for *Beams*, *Doors*, *Windows*, and *Masts* of *Ships*, resists the *worm*; being driven into the ground, it is almost petrified, and will support an incredible Weight; which (and for its property of long resisting *fire*) makes *Vitruvius* wish, they had greater plenty of it at *Rome* to make *Goists* of, where the *Forum* of *Augustus* was (it seems) built of it, and divers *Bridges* by *Tiberius*; for that being attempted with *Fire*, it is long in taking hold, growing only black without. From this *Tree* it is, that useful *Drug Agaric* is gathered; and the *timber* of it is so exceedingly transparent, that *Cabanes* made of the thin *boards*, when in the dark night, they have lighted candles, people, who are at a distance without doors, would imagine the whole room to be on fire, which is pretty odd, considering there is no material so unapt to kindle. The *Larix* bears polishing ex-

cellently well, and the *Turners* abroad much desire it: *Vitruvius* says 'tis so ponderous, that it will sink in the water. That which now grows some where about *Chelmsford* in *Essex*, arriv'd to a flourishing, and ample *Tree*, does sufficiently reproach our negligence, and want of *industry*, as well as the incomparable, and snady.

2. *Platanus*, that so beautiful, and precious *Tree*, so doated on by *Xerxes*, that *Ælian* and other *Authors* tell us he made halt, and stop'd his prodigious *Army* of *seventeen hundred thousand* Soldiers, which even cover'd the *Sea*, exhausted *Rivers*, and thrust Mount *Athos* from the *Continent*, to admire the pulchritude, and procerity of one of these goodly *Trees*, and became so fond of it, that spoiling both *himself*, his *Concubines*, and great Persons of all their *jewels*, he cover'd it with *Gold*, *Gemms*, *Neck-laces*, *Scarfs* and *Bracelets*, and infinite riches; In sum, was so *enamor'd* of it, that for some days, neither the concernment of his grand *Expedition*, nor interest of *honour*, nor the necessary motion of his portentous *Army*, could perswade him from it: He styl'd it his *Mistress*, his *Minion*, his *Goddes*; and when he was forc'd to part from it, he caus'd the figure of it to be stamp'd in a *Medail* of *Gold*, which he continually wore about him. Whereever they built their sumptuous, and magnificent *Colleges* for the exercise of Youth in *Gymnastics*, as *Riding*, *Shooting*, *Wrestling*, *Running*, &c. (like to our *French Academies*) and where the graver *Philosophers* also met to converse together, and improve their *Studies*, betwixt the *Xista*, and *Subdiales ambulationes* (which were *Porticos* open to the air) they planted *Groves*, and *Walks* of *Platans*, to refresh, and shade the *Palæstræ*; as you have them describ'd by *Vitruvius*, lib. 5. cap. 11. and as *Claudius Perrault* has assisted the *Text*, with a *Figure*, or *Ichnographical* plot. These *Trees* the *Romans* first brought out of the *Levant*, and cultivated with so much industry and cost, for its stately and proud head only; that great *Orators*, and *States-men*, *Cicero*, and *Hortensius* would exchange

Platanus.

Macrob. Saturnal. 3.

now and then a *turn* at the *Bar*, that they might have the pleasure to step to their *Villas*, and refresh their *Platans*, which they would often *irrigate* with *Wine* instead of *Water*; and so priz'd the very shadow of it, that when afterwards they transplanted them into *France*, they exacted a *Tribute* of any of the *Natives*, who should presume but to put his *head* under it. *Pliny* tells us there is no *Tree* whatsoever which so well defends us from the *heat* of the *Sun* in *Summer*; nor that admits it more kindly in *Winter*. And for our encouragement, I do upon experience assure you, that they will flourish, and abide with us, without any more trouble than frequent, and plentiful *Watering*, which from their youth, they excessively delight in, and gratefully acknowledge by their growth accordingly; so as I am perswaded, that with very ordinary *Industry*, they might be propagated to the incredible *Ornament* of the *Walks*, and *Avenues* to Great-mens houses.

at work for the *Materials* of one only *Temple* and a *Palace*, 'tis a pregnant *Example* what *Time*, and *Neglect* will bring to *ruine*, if due, and continual care be not taken to propagate *Timber*. We

see almost the whole tract of *Apennines*, strip'd of the *Pines* and *Firs* (which formerly as *Vitruvius* testifies L. 2. C. 10. covered those *Mountains*) to that degree, as to render not only the *City* of *Florence*, but *Rome* herself so expos'd to the nipping *tr'a montane Winds* (as they call the *North*) that almost nothing which is rare, and curious, will grow without art and *hyemation*; so as even in most of those parts of *Italy* flanker'd by those *hills*, (and cover'd as now they perpetually are with *snow*) they are fain to house their *Orange*, and other tender *Trees* as we do here in *England*.

4. Nor is it any wonder if we find the whole *Species* of some *Trees* so totally lost in a *Countrey*, as if there had never been any such planted in it; Be this therefore applied to *Fir*, *Pine*, and many others with us; since it was so long ere *Rome* was acquainted with them, or indeed with any of the *Pitch*-bearers we have mention'd.

5. We had out first *Myrtils* out of *Greece*, and *Cypress* from *Crete*, which was yet a meer stranger in *Italy*, as *Pliny* reports, and most difficult to be rais'd; which made *Cato* to write more concerning the *culture* of it, than of any other *Tree*: Notwithstanding we have in this *Country* of ours, no less than three sorts,

9. For all uses, that *Timber* is esteem'd the best, which is the most *ponderous*, and which lying long, makes deepest *impression* in the *Earth*, or in the *Water* being floated; also what is without *knöts*, yet firm, and free from *sap*; which is that fatty, *whiter*, and *softer* part, call'd by the Antients *Alburnum*, which you are diligently to hew away; here we have much ado about the *Torulus* of the *Fir*, and the $\phi\lambda\omega\iota\delta\eta\varsigma \ \omega\upsilon\lambda\lambda\omicron$ by both *Vitruvius* and *Theophrastus*, which I pass over. You shall perceive some which has a *spiral* convolution of the *veins*; but it is a vice proceeding from the severity of unseasonable *Winters*, and defect of good *nutriment*.

10. My Lord *Bacon* Exp. 658. recommends for *tryal* of a *sound* or *knotty* piece of *Timber*, to cause one to speak at one of the *Extreams* to his Companion listning at the other; for if it be *knotty*, the *sound* (says he) will come abrupt.

11. Moreover, it is expedient that you know which is the *Grain*, and which are the *Veins* in *Timber* (whence the term *fluviari arborem*) because of the difficulty of working against it: Those therefore are counted the *veins* which grow largest, and are softer for the benefit of *Cleaving*, and *Hewing*; that the *Grain* or *Pectines*, which runs in waves, and makes the divers and beautiful *chamfers* which some *woods* abound in to admiration.

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Nay, the Wise *Solon* prescribed *Ordinances* for the very *distances* of *Trees*; as the divine *Plato* did against stealing of *fruit*, and violating of *Plantations*: And the interdiction *de Glanede legenda* runs thus in *Ulpian*, *AIT PRÆTOR, GLANDEM, QUÆ EX ILLIUS AGRO IN TVUM CADIT, QVO MINVS ILLI TERTIO QVOQUE DIE LEGERE AVFERRE LICEAT, VIM FIERI VETO.* And yet, though by the *Prætors* permission he might come every *third* day to gather it up without *Trespass*, his *Neighbour* was to share of the *Mast* which so fell into his *Ground*; and this *Chapter* is well supplied by *Pliny* l. 16. c. 5. and *Cajus* upon the *Place*, interprets *Glandem* to signifie not the *Acorns* of the *Oak* alone, but all sorts of *fruit* whatsoever, l. 136. F. de Verb. Signif. L. *Unis* ff. de *Glan-de leg* as by usage of the *Greeks*, amongst whom *ἀνεόςφυα* imports all kind of *Trees*.

Moreover, no *Trees* might be Planted near *Publique Aquæ-duçts*, lest the *Roots* should insinuate into, and displace the *Stones*: Nor on the very margent of *Navigable Rivers*, lest the *Boats* and other *Vessels* passing to and fro, should be hindred, and therefore such impediments were call'd *Retæ*, *quia Naves retinent*, says the *Gloss*; and because the falling of the *leaves* corrupted the *Water*. So nor within such a distance of *High-ways* (which also our own *Laws* prohibit) that they might *dry* the better, and less cumber the *Traveller*. *Trees* that obstructed the *Foundation* of *Houses* were to be fell'd; *Barthol. L. 1. doct. c. de Interdict. Vlp. in L. priore ff. de Arborum cadend.* *Trees* spreading their *Roots* in neighbour-ground, to be in *common*;

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To these I might add the *Laws* of our King *Ina*; or as the Learned *Lambert* calls them, *Αρχαιονομία de priscis Anglorum legibus*, whose Title is, *Be þu þa þne*: of *Burning Trees*: The *Sanction* runs thus.

If any one set fire of a fell'd Wood, he shall be punished, and besides pay three pounds, and for those who clandestinely cut Wood (of which the very sound of the Axe shall be sufficient Conviction) for every Tree he shall be mulcted thirty shillings. A Tree so fell'd under whose Shadow thirty Hogs can stand, shall be mulcted at three pounds, &c.

16. I have heard, that in the great Expedition of 88, it was expressly enjoind the *Spanish* Commanders of. that signal *Armada*;

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that if when landed they should not be able to subdue our Nation, and make good their *Conquest*; they should yet be sure not to leave a Tree standing in the *Forest* of *Dean*: It was like the *Policy* of the *Philistines*, when the poor *Israelites*, went down to their Enemies *Smiths* to sharpen every man his *Tools*; for as they said, lest the *Hebrews* make them *Swords*, or *Spears*; so these, lest the *English* build them *Ships*, and *Men of War*:

In some parts of *Germany*, where a single *Tree* is observ'd to be extraordinary fertile, a constant, and plentiful *Mast-bearer*; there are *Laws* to prohibit their *selling* without special leave: And it was well *Enacted* amongst us, that even the *Owners* of *woods* within *Chases*, should not cut down the *Timber* without view of *Officers*; this *Act* being in *affirmance* of the *Common Law*, and not to be violated without *Prescription*: See the *Case* cited by my Lord *Cook* in his *Comment on Littleton. Tenure Burgage. L. 2. Sect. 170.* Or if not within *Chases*, yet where a *Common-person* had liberty of *Chase*, &c. and this would be of much benefit, had the *Regarders* perform'd their duty, as 'tis at large described in the *Writ* of the 12 *Articles*; and that the *Surcharge* of the *Forests* had been honestly inspected with the due *Perambulations*, and ancient *Metes*: Thus should the *Justices* of *Eire* dispose of no *Woods* without express *Commission*, and in convenient places: *Minuti blaterones quercuum, culi, & curbi*, as our *Law* terms *wind-falls*, *dottercls*, *scrags*, &c. and no others.

10. Care is likewise by our *Laws* to be taken that no unnecessary *Imbezilment* be made by pretences of Repair of *Paling*, *Lodges*, *Browse* for *Deer*, &c. *Wind-falls*, *Root-falls*; dead, and *Sear-trees*, all which is subject to the Inspection of the *Warders*, *Justices*, &c. and even trespasses done *de Viridi* on boughs of *Trees*, *Thickets*, and the like; which (as has been shew'd) are very great impediments to their growth and prosperity, and should be duly looked after; and punish'd; and the great neglect of *Swainmote-Courts* reformed, &c. See *Consuet. & Assis. Forest. Pannagium, or Pastura pecorum & de Glandibus, Fleta, &c. Manwoods Forest-laws: Cook pla. fol. 366. li. 8. fol. 138.*

11. Finally, that the exorbitance, and increase of devouring *Iron-mills* were looked into, as to their *distance*, and *number* near the *Seas*, or *Navigable Rivers*; And what if some of them were even *remov'd* into another *world*? 'twere better to purchase all our *Iron* out of *America*, than thus to exhaust our *woods* at home, although (I doubt not) they might be so order'd, as to be rather a means of conserving them. There was a *Statute* made by Queen *Eliz.* to prohibit the converting of *Timber-trees* to *Coal*, or other *Fuel* for the use of *Iron-mills*; if the *Tree* were of one foot square, and growing within fourteen Miles of the *Sea*, or the greater *Rivers*, &c.

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29. We find in *Aristotles Politics*, the Constitution of *Extra-urban Magistrates* to be *Sylvarum Custodes*; and such were the *Con-sulares Sylva*, which the great *Cæsar* himself (even in a time when *Italy* did abound in *Timber*) Instituted; and was one of the very first things which he did, at the settling of that vast *Empire*, after the *Civil Wars* had exceedingly wasted the Country: *Suetonius*

*De collegiis Fæ-
briorum, Centona-
riorum, & Den-
drophororum,
Navicularior.
ratorum exerci-
tor. & Caudi-
cariorum,*

relates it in the Life of *Julius*; and *Peter Crinitus* in his fifth Book *De honesta disciplina*, c. 3. gives this reason for it, *Ut materies* (saith he) *non deesset, qua videlicet Navigia publica possent à præfecturis fabricum, confici*: True it is, that this Office was sometimes call'd *Provincia minor*; but for the most part, annex'd, and joyn'd to some of the greatest *Consuls* themselves; that facetious *sarcastme* of the *Comedian* (where *Plautus* names it *Provincia caudicaria*) referring only to some under *Officer*, subservient to the other: And such a *Charge* is at this day extant amongst the noble *Venetians*, who have near *Trivisi* (besides what they nourish in other places) a goodly *Forest of Oaks*, preserv'd as a *Jewel*, for the only use of the *Arsenal*, call'd the *Montello*, which is in length *twelve Miles*, large *five*, and near *twenty miles* in compass; carefully supervised by a certain *Officer*, whom they name *il Capitano*; and we might *Instance* in many other prudent *States*; not to importune you with the express *Laws* which *Ancus Martius* the Nephew of *Numa*, and other *Princes* long before *Cæsar*, did ordain for this very purpose; since indeed, the care of so publick, and honourable an *Enterprize* as is this of *Planting*, and *Improving of Woods*, is a right noble, and *Royal undertaking*; as that of the *Forest of Dean*, &c. in particular (were it bravely manag'd) an *Imperial design*; and I do pronounce it more worthy of a *Prince*, who truly consults his *glory* in the highest *Interest* of his *Subjects*, than that of gaining *Battels*, or subduing a *Province*:

plurima
extant Inscripti-
ones apud
Lipsum in lib.
Inscript. antiq.
quales Bergo-
mensium, Brix-
ianoy. Comen-
sium, Lugdunens.
Aravicorum &
Rhodanicor. eo-
rumq; corporum;
& Collegiorum
patronis curato-
ribus. Vide e-
tiam Hieron.
Rubeum l. 1.
Hist. Ravennat.
Item de Den-
drophoris Lod.
Theodof. l. 1.
& 2. iisdem
verbis inscrip-
to: Morisot.
Orb. Marit. l.
1. c. 24.

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18. But lest this be charg'd with *Superstition*, because the *Instances* are *Heathen*: It was a more noble and remarkable, as well as recent *Example*, when at the *Siege of Breda*, the late Famous General *Spinola* Commanded his *Army* not to violate a *Tree* of a certain *Wood* belonging to the *Prince of Orange* there, though a reputed *Traitor*, and in open defiance with his Master. In sum, we read that when *Mithridates* but deliberated about the cutting down of some stately *Trees* which grew near *Patara*, a *City of Lycia*, though necessitated to it for the building of *Warlike Engines* with them, being terrifi'd in a *Vision*, he desisted from his purpose.

But this, in terror only, and for Caution to *Posterity*, whiles we leave the *Guilty*, and those who have done the *Mischiefs*, to their proper *Scorpions*, and to their *Erisichthonian*-fate, or that of the inexorable *Paræbius*, the vengeance of the *Dryads*, and to their *Tutelar* better *Genius*, if any yet remain, who love the solid *Honour* and *Ornament* of their *Countrey*: For what could I say less, *Trojans*,

and * *Wood-born* as I am, in behalf of those *Sacred Shades*, which both grace our *Habitations*, and protect our *Nation*?

from *Trees* have been denominated whole Countries, Regions, Cities and Towns; as *Cyparissia* in *Greece*, *Cerasus* in *Pontus*, *Laurentum* in *Italy*, *Myrrhinus* in *Attica*. Ports, Mountains and eminent Places; as the

* At *Wootton* in
Surrey: For
so in all ages

Viminalis, Aesculetum, &c. The reason is obvious, from the spontaneous growth and abounding of such Trees in the respective Soyles.

20. But whilst we condemn this *Excess* in them; *Christians*, and true *Philosophers* may be instructed to make use of these *Enjoyments* to better purposes, by contemplating the *Miracles* of their Production and structure: [And what *Mortal* is there so perfect an *Atomist*, who will undertake to detect the *thousandth* part, or point of so exile a *Grain*; as that insensible rudiment, or rather *balituous Spirit*, which brings forth the lofty *Fir-tree*, and the spreading *Oak*? That *Trees* of so enormous an height and magnitude, as we find some *Elms*, *Planes*, and *Cypresses*; some hard as *Iron*, and solid as *Marble* (for such the *Indies* furnish many) should be swaddl'd, and involv'd within so small a dimension (if a

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point may be said to have any) without the least luxation, confusion or disorder of Parts, and in so weak and feeble a substance; being at first but a kind of tender *mucilage*, or rather rottenness, which so easily dissolves and corrupts *Substances* so much harder, when they are buried in the moist Womb of the *Earth*, whilst *this* tender, and flexible as it is, shall be able in time to displace and rent in sunder whole *Rocks* of stones, and sometimes to cleave them beyond the force of *Iron Wedges*, so as even to remove *Mountains*? For thus no *Weights* are observ'd able to suppress the victorious *Palm*; And thus, our *Tree* (like *Man* whose inverted *Symbol* he is) being sown in *corruption*, rises in glory by little and little ascending into an hard erect *Stem* of comely dimensions, into a solid *Tower* as it were; and that which but lately a single *Ant* would easily have born to his little *Cavern*, now capable of resisting the fury, and braving the Rage of the most impetuous *storms*, *Magni mehercle artificis, clausisse totum in tam exiguo* (to use *Seneca's* expression) & horror est consideranti.

Epist. 53.

21. Contemplate we again, What it is which begins this motion or *flame*, causing it first to *radiate* in the *Earth*, and then to display its Top in the *Air*, so different *Poles* (as I may call them) in such different *Mediums*. How it elects, and then intro-sumes its proper food, and gives *Suck*, as it were, to its yet tender *Infant*, till it have strength and force to prey on, and digest the more solid *Juices* of the *Earth*; for then, and not 'till then, do the *Roots* begin to harden: Consider how it *assimilates*, *separates*, and *distributes* these several supplies; how it *concocts*, *transmutes*, *augment*s, *produces* and *nourishes* without separation of *Excrements* (at least to us visible) and *generates* its like, without violation of *Virginity*: By what exquisite *percolations*, and *fermentations* it proceeds; for the *Heart*, *Fibers*, *Veins*, *Rind*, *Branches*, *Leaves*, *Blossoms*, *Fruit*; for the *strength*, *Colour*, *Tast*, *Odour* and other stupendious *Qualities*, and distinct *Faculties*, some of them so repugnant and contrary to others; yet in so uniform, and successive a *Series*, and all this perform'd in the dark, and those fe-

cret Recesses of Nature. *Quid Foliorum describam diversitates?* What shall we say of the *Mysterious* forms, *variety*, and *variegation* of the *Leaves* and *Flowers*, contriv'd with such *Art*, yet without *Art*; some *round*, others *long*, *Oval*, *Multangular*, *indented*, *crisp'd*, *rough*, *smooth* and *polished*, *soft* and *flexible* at every tremulous blast, as if it would drop in a moment, and yet so obstinately adhering, [as to be able to contest against the fiercest *Winds*, that prostrate mighty Structures, raising *Hurricanes*, the violence whereof whole *Fleets* and *Countries* do often feel; yet I say, continually making War, and sometimes joyning Forces with steeming showers, against the poor *Leaf*, tyed on by a slender *stalk*! there it abides 'till *God* bids it fall: For so the *wise Disposer* of Things has plac'd it, not only for *Ornament*, but *use* and *protection* both of *Body* and *Fruit*, from the excessive *heat* of *Summer*, and *colds* even of the sharpest *Winters*, and their immediate impressions;

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22. Let us again examine with what care the *Seeds*, those little *Souls* of Plants, *Quorum exilitas* (as one says) *vix locum inveniat* (in which the whole, and compleat *Tree*, though invisible to our dull sense, is yet perfectly and intirely wrapp'd up) are preserv'd from *avolation*, diminution and detriment; expos'd, as they seem to be, to all those accidents of *Weather*, *storms* and *rapacious* Birds, in their spiny, arm'd and compacted *Receptacles*; where they sleep as in their *Caus'es*, 'till their *Prisons* let them gently fall into the embraces of the *Earth*, now made pregnant with the *Season*, and ready for another *Burthen*: For at the time of *Year* she fails not to bring them forth; and with what delight have I beheld this tender, and innumerable Off-spring *repullulating* at the *Feet* of an aged *Tree*! from whence the *Suckers* are drawn, transplanted and educated by humane *Industry*, and forgetting the *ferity* of their *Nature*, become *civiliz'd* to all his *Employments*.

23. Can we look on the prodigious quantity of *Liquor*, which one poor wounded *Birch* will produce in a few *hours*, and not be astonish'd how some *Trees* should in so short a space, *Weep* more than they *weigh*? and that so dry, so feeble and wretched a *branch* as that which bears the *Grape*, should yield a *Juice* that *Cheers* both *God* and *Man*? That the *Pine*, *Fir*, *Larch*, and other *Resinous* *Trees*, Planted in such rude, and uncultivated places, amongst *Rocks* and dry *Pumices*, should transude into *Turpentine*, and pearl out into *Gums*, and pretious *Balms*?

24. There are ten Thousand Considerations more, besides that of their *Medicinal* and *Sanative* properties, and the *Mechanical* *Uses* mention'd in this *Treatise*, which a *Contemplative* Person may derive from the *Groves* and the *Woods*; all of them the Subject of *Wonder*;

This surface-Mold is the best, and sweetest, being enriched with all that the Air, Dews, Showers, and Cele-

stial Influences can contribute to it: For 'tis with good *Earth*, as with excellent *Water*, that's the best, which with least difficulty receives all external qualities; for the fatness of this *Under-turf* Mold, being drawn up by the kindly warmth of the Sun to the superficies, spends but little of its vigour in the Grass and tender verdure which it produces, and easily nourishes without dissipating its virtue, provided no rank Weeds, or predatitious Plants (consummating their Seeds) be suffered to grow and exhaust it; but maintains its natural force, and is therefore of all other uncultivated Molds the most grateful to the Husbandman.

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My Lord *Bacon* directs to the observation of the *Rain-bow*, where its extremity seems to rest, as pointing to a more roscid and fertile Mold; but this, I conceive, may be very fallacious, it ha-

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ving two horns, or bases, which are ever opposite.

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There are, I confess, who fantasie that this long exposure of *Earth* before it be employed for a Crop, causes it to exhale, and spend the virtue which it should retain; but, provided nothing be suffered to grow on it whilst it lies thus rough and fallow, there's no danger of that; there being in truth, no compost, or *latation* whatsoever comparable to this continual motion, *repastination*, and turning of the Mold with the Spade; the pared-off Turf (which is the very fat, and *efflorescence* of the *Earth*) and even *Weeds* with their vegetable *Salts*, so collected into heaps, and exposed, being reduced, and falling into natural, sweet, and excellent Mold. I say, this is a marvellous advantage, and does in greater measure fertilize the ground alone, without any other additament: For the *Earth*, which was formerly dull and unactive, or perhaps producing but one kind of Plant, will by this culture dispose it self to bring forth variety, as it lies in depths, be it never so profound, cold and crud, the nature of the Plant always following the genius of the Soil; but indeed requiring time, according to the depth from whence you fetch it, to purge and prepare it self, and render it fit for conception, evaporating the malignant *Halitus's* and impurities of the imprisoned air, laxing the parts, and giving easie deliverance to its off-spring.

I do not dispute, whether all Plants have their *primigenial* Seeds, and that nothing emerges spontaneously, and at adventure; but, that these would rise freely, in all places, if impediments were removed (of which something has already been spoken;) and to

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shew, how pregnant most *Earths* would become, were these indispositions cured, and that those seminal rudiments, wherever latent, were free to move, and exert their virtue, by taking-off these Chains and Weights which fetter and depress them.

It is verily almost a miracle to see, how the same Land, without any other Manure or Culture, will bring forth, and even luxuriate;

and that the bare raking and *combing* only of a bed of *Earth*, now one way, then another, as to the *regions* of Heaven, and *polar Aspects*, may diversifie the annual production, which is a *secret* worthy to be considered :

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I proceed with what I call more natural helps ; namely, as we have shewed, *by opening, stirring, and ventilating the Earth*, and sometimes its contrary, *by coverture, shade, rest, and forbearance for a season*, [as we daily see it practised in our worn-out and exhausted lay-fields, which enjoy their *Sabbaths*.] 'Tis certain, that for our *Gardens* of Pleasure; the fairest beauties of the *Parterre*, require rather a fine, quick, friable, and well-wrought Mold, than a rank or richly dunged : and even all *Fruit-Trees* affect not to stand upon artificial and loose *Composts*, but in naturally rich, and sweet mold, within the scent and neighbour-hood of well-consum'd *Soil* for the next *layer* under, and above ; so as the virtue thereof may be derived to it through a *colature* of natural *Earth* ; those forcing mixtures being more proper for *Annuals*, and *Exotic* toys, which having but little time to live, refuse no assistances, whilst *Trees* of longer durance, care not much for accelerations.

Dr. Beale.

I shall here then begin with an *experiment* I have been taught by a learned Person of this illustrious Body, from whom I have long since received the choicest documents upon *this* and many curious subjects. And first, That amongst the mechanical aids, (wherein *stercoration* has no hand) *that* of pulverizing the *Earth* by confusion, and breaking it with Plow or Spade, is of admirable effect to dispose it for the reception of all the natural impregnations we have been discoursing upon, as constant and undenyable, I think will be evinced. [For the *Earth*, especially if fresh, has a certain *magnetism* in it, by which it attracts the *Salt*, power, or virtue (call it either,) which gives it life, and is the *Logic* of all the labour and stir we keep about it, to sustain us ; all *dungings* and other sordid temperings, being but the *vicars* succedaneous to this improvement, which of all other makes its return of Fruit, or whatsoever else it bears, without imparting any of those ill and pernicious qualities, which we sensibly discover from forced grounds ; and that not only in the *Plants* which they produce, but in the very *Animals* which they feed and nourish.

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For to enumerate some of its perfections ; such as refuse *Dung*, and violent applications, have *here* pure *Earth* ; and such as require aid, a mellow and rich mold, impregnated with all the blessings which the Influences of the Heaven, and *efflorescence* of the *Earth* can contribute to it ; fitted, as it is, for Generation, and yet so restrain'd from it, as greedily to receive the first *seeds*, which are committed to it, with a passion, and fervency as it were of animal love. [What high, and sublime things are spoken more upon this, I forbear to prosecute ; but in

Sir *Kenelme Digby's* discourse of *Sympathetic Powder*, he affirms, that the *Earth* in the years of repose recovers its Vigor, by the attraction of the Vital Spirits, which it receives from the air, and those superiour irradiations, which endow simple *Earth* with qualities promoting *fermentation*. And indeed, such a vegetative activity I have often observ'd in the bare exposure of some Plants but for a few hours only, as has rais'd my admiration, particularly, in the *Aloe*, and other kinds of *Sedums*, which, when to all appearance shrunk, and shrivel'd up, have fill'd themselves in a moment, set out in the *Air*, when a very few drops of water (at the same, that is, Winter, time) would certainly have made it rot, and turn to a mucilage, as, to my cost, I have experienc'd.

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enclosures of walls and mounds, when the land lies in the eye of the weather; and in other cases, *meridian* exposures, and the warmth of the woolly fleeces of *Sheep* as well as manure, folded or pastur'd: And to this we may add the very *grazing* of *Cattle*, which in some cases has succeeded better than the best *dungy-compost*, especially for old, and decay'd *Orchards*, which have been observ'd to recover to admiration, when mowing has been pernicious; for even the biting of *Cattel* gives a gentle loosening to the roots of the herbage, and makes it to grow fine and sweet, and their very breath and treading, as well as soil, and the comfort of their warm bodies is wholesome, and marvellously cherishing: But this is to be understood of places where the stems are of full growth, and where the beast cannot reach to crop.

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P O M O N A .

CHAP. I. Of the Seminary.

Whosoever expects from the *kernel* of a rich or peculiar *Apple* or *Pear* to raise *Fruit* of the *same kind*, is likely to find many obstructions and disappointments: For the *Wilding*, (*Crab* or *Pear*) *Pomus Sylvestris*, being at the best the natural product of the soundest *kernel* in the firmest land, and therefore the gust of the *Fruit* more strongly austere, fierce, and sharp, and also the *Fruit* less and more woody; and the pleasanter or plumper and larger *Apple* being the effect of some inteneration, which inclines to a kind of rebatement of the natural strength of the Tree; the best choice of *kernels* for *Stocks* indefinitely, (and on which we may graff what we please) should be from the soundest *Wilding*. For,

A *kernel* taken from any *grafted-Apple*, as *Pepin*, *Pear-main*, &c. does most naturally propend to the wildness of the *Stock* on which

'twas inferted, as being the natural mother of the *kernel*, which is the very heart of the *Apple*; and also from a more deep and secret *Reason*, to be hereafter unfolded.

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Concerning Cider.

28. The time of drawing *Cider* into *Bottles* is best in *March*, it being then clarified by the *Winter*, and free from the heat of the *Sun*.

29. In drawing, the best is nearest the heart or middle of the Vessel, as the *Yolk* in the *Egg*.

30. *Red-strakes* are of divers kinds, but the name is in *Herefordshire* appropriated to one kind, which is fair and large, of a high purple colour, the smell *Aromatic*

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Now, for knowing when it is fit to *Bottle*, I know no certain Rule that can be given, but to broach the *Vessel* with a small *Piercer*, and in that hole fit a peg, and now and then (two or three times in a day) draw a little, and see what fineness it is of; for when it is bottled it must not be perfectly fine; for if it be so, it will not fret in

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the bottle, which gives it a fine quickness, and will make it mantle and sparkle in the glass, when you pour it out: And if it be too thick when it is bottled, then, when it hath stood some time in the bottles it will ferment so much that it may possibly either drive out the *Corks*, or break the bottles, or at least be of that sort (which some call *Potgun-drink*) that when you open the bottles it will fly about the house, and be so windy and cutting that it will be inconvenient to drink: For the right temper of *Bottle-Cider* is, that it mantle a little and sparkle when it is put out into the glass; but if it froth and fly, it was bottled too soon:

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after the rate which we set upon *life-honey* (that which in like sort drops freely out of the *Combs*) above that which renders not it self without compression. In *Jersey* they value it a *Crown* upon an *Hogshead* dearer than the other: (This I take from the Relation of one of my Neighbours, who sometimes lived in that *Island*, which for *Apples* and *Cider* is one of the most famous of all belonging to his *Majesties* Dominions)

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Deans-Apple, and the *Pelesantine* I think may be mention'd in the third place; neither of which need the Addition of other *Apples* to set off the Relish, as do the rest of our choicest Fruits. *Pepins*, *Pearmains*, and *Gilliflowrs* commixt, are said to make the best *Cider* in the world. In *Jersey* 'tis a general obervation, as I hear, That the more of red any *Apple* hath in its rind, the more proper it is for this use. *Paleface't-Apples* they exclude as much as may be from their *Cider-Vat*.

TRAVELS

THROUGH

THE ALPS OF SAVOY

AND

OTHER PARTS OF THE PENNINE CHAIN

WITH OBSERVATIONS ON THE PHENOMENA OF

GLACIERS.

BY

JAMES D. FORBES, F.R.S., SEC. R.S. ED., F.G.S.,

CORRESPONDING MEMBER OF THE INSTITUTE OF FRANCE,
AND PROFESSOR OF NATURAL PHILOSOPHY IN THE UNIVERSITY OF EDINBURGH.

Sage mir was du an diesen kalten und starren Liebhabereyen gefunden hast.
GÖTTING.

EDINBURGH:

ADAM AND CHARLES BLACK,
AND LONGMAN, BROWN, GREEN, AND LONGMANS, LONDON.

M.DCCC.XLIII.

Studer's barometer was the only instrument for measuring heights which we could at the time depend upon, but I had a portable sympiesometer, by Adie, constructed on purpose for this journey, but whose indications required a special correction difficult to determine, and one of those very convenient Russian furnaces, made by Stevenson of Edinburgh, which proved an invaluable adjunct for melting snow, for making tea, and at the same time for ascertaining the temperature of boiling water by a thermometer, which I had adapted to it, reading from 185° to 213° Fahr., and on which a fiftieth of a degree was capable of estimation. This is the only instrument which I have found capable of resisting sufficiently the influence of wind and cold to produce boiling water even from snow, in almost any situation, and it replaced the barometer usefully, on several occasions, as will be seen.* Our appearance was sufficiently remarkable to attract the attention of the passers by, of whom, at this early hour, there were a number on their way, to spend the day at Orsières, as it happened to be a great festival in this and the neighbouring valleys,—the eve of the Assumption of the Virgin. The day, as I have said, was splendid, and promised to be very warm; but our course, as far as Chable, lay almost entirely on the shady side of the valley of Bagnes, which we entered by turning abruptly to our right, before entering the village of St. Branchier, an hour's walk below Orsières.

The path, which was scarcely traced on the left bank of the rapid and impetuous Dranse, passed through woods and meadows, and the whole scene was refreshing and peaceful in the highest degree, and seemed to augur success to an excursion so happily commenced. Chable is a considerable village, very pleasantly situated in a tolerably open space, into which the valley enlarges itself, near the foot of the Pierre à Voie, a conspicuous summit, which separates this valley from that of the Rhone, and not far from which a path leads from Chable to Riddes,

* An account of the method used for calculating heights from the temperature of boiling water will be found in the *Edinburgh Transactions*, vol. xv., part 3. I have found that the temperature of the boiling point falls 1° Fahr. for 550 feet of ascent, uniformly for all heights.

NARRATIVE OF A JOURNEY

TO THE SHORES OF

THE POLAR SEA.

IN THE YEARS

1819, 20, 21, & 22.

BY

JOHN FRANKLIN, CAPTAIN R.N., F.R.S.

AND COMMANDER OF THE EXPEDITION.

WITH AN APPENDIX CONTAINING GEOGNOSTICAL OBSERVATIONS, AND REMARKS ON THE AURORA BOREALIS.

ILLUSTRATED BY A FRONTISPIECE, AND MAP.

PUBLISHED BY AUTHORITY OF THE RT. HON. THE EARL BATHURST.

PHILADELPHIA:

H. O. CAREY & I. LEA, A. SMALL, EDWARD PARKER, M'CARTY, & DAVIS, B. & T. KITE, THOMAS DESILVER, AND E. LITTELL.

1824.

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INTRODUCTION.

His Majesty's Government having determined upon sending an Expedition from the Shores of Hudson's Bay by land, to explore the Northern Coast of America, from the Mouth of the Copper-Mine River to the eastward, I had the honour to be appointed to this service by Earl Bathurst, on the recommendation of the Lords Commissioners of the Admiralty; who, at the same time, nominated Doctor John Richardson, a surgeon in the Royal Navy, Mr. George Back, and Mr. Robert Hood, two Admiralty Midshipmen, to be joined with me in the Expedition. My instructions in substance informed me, that the main object of the Expedition was that of determining the latitudes

and longitudes of the Northern Coast of North America, and the trending of that Coast from the Mouth of the Copper-Mine River to the eastern extremity of that continent; that it was left for me to determine, according to circumstances, whether it might be most advisable to proceed, at once, directly to the northward till I arrived at the sea-coast, and proceed westerly towards the Copper-Mine River; or advance, in the first instance, by the usual route to the Mouth of the Copper-Mine River, and from thence easterly till I should arrive at the eastern extremity of that Continent; that, in the adoption of either of these plans, I was to be guided by the advice and information which I should receive from the wintering servants of the Hudson's Bay Company, who would be instructed ' . . .

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The summer birds by this time had entirely deserted us, leaving, for our winter companions, the raven, cinereous crow, ptarmigan, and snow-bird. The last of the water-fowl that quitted us was a species of diver, of the same size with the *colymbus arcticus*, but differing from it in the arrangement of the white spots on its plumage, and in having a yellowish white bill. This bird was occasionally caught in our fishing nets.

The thermometer during the month of October, at Fort Enterprise, never rose above 37°, nor fell below 5°; the mean temperature for the month was 23°.

In the beginning of October a party had been sent to the westward to search for birch to make snow-shoe frames, and the Indian women were afterwards employed in netting the shoes and preparing leather for winter clothing to the men. Robes of reindeer skins were also obtained from the Indians, and issued to the men who were to travel, as they are not only a great deal lighter than blankets, but also much warmer, and altogether better adapted for a winter in this climate. They are, however, unfit for summer use, as the least moisture causes the skin to spoil, and

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lose its hair. It requires the skins of seven deer to make one robe. The finest are made of the skins of young fawns.

The fishing, having failed as the weather became more severe, was given up on the 5th. It had procured us about one thousand two hundred *white fish*, from two to three pounds each. There are two other species of *salmo* in Winter Lake; *Back's grayling* and the *round fish*, and a few *trout*, *pike*, *melhige*, and *red carp*, were also occasionally obtained from the nets. It may be worthy of notice here, that the fish froze as they were taken out of the nets, in a short time became a solid mass of ice, and by a blow or two of the hatchet were easily split open, when the intestines might be removed in one lump. If in this completely frozen state they were thawed before the fire, they recovered their animation. This was particularly the case with the carp, and we had occasion to observe it repeatedly, as Dr. Richardson occupied himself in examining the structure of the different species of fish, and was always, in winter, under the necessity of thawing them before he could cut them. We have seen a carp recover so far as to leap about with much vigour, after it had been frozen for thirty-six hours.

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The commencement of April was fine, and for several days a considerable thaw took place in the heat of the sun, which laying bare some of the lichens on the sides of the hills, produced a consequent movement of the rein-deer to the northward, and induced the Indians to believe that the spring was already commencing. Many of them, therefore, quitted the woods, and set their snares on the barren grounds near Fort Enterprise. Two

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or three days of cold weather, however, towards the middle of the month, damped their hopes, and they began to say that another moon must elapse before the arrival of the wished-for season. In the mean time their premature departure from the woods, caused them to suffer from the want of food, and we were in some degree involved in their distress. We received no supplies from the hunters, our nets produced but very few fish, and the pounded meat which we had intended to keep for summer use was nearly expended. Our meals at this period were always scanty, and we were occasionally restricted to one in the day.

The Indian families about the house, consisting principally of

women and children, suffered most. I had often requested them to remove to Akaiteho's lodge, where they were more certain of receiving supplies; but as most of them were sick or infirm, they did not like to quit the house, where they daily received medicines from Dr. Richardson, to encounter the fatigue of following the movements of a hunting camp. They cleared away the snow on the site of the autumn encampments to look for bones, deers' feet, bits of hide, and other offal. When we beheld them knawing the pieces of hide, and pounding the bones, for the purpose of extracting some nourishment from them by boiling, we regretted our inability to relieve them, but little thought that we should ourselves be afterwards driven to the necessity of eagerly collecting these same bones a second time from the dunghill.

At this time, to divert the attention of the men from their wants, we encouraged the practice of sliding down the steep bank of the river upon sledges. These vehicles descended the snowy bank with much velocity, and ran a great distance upon the ice. The officers joined in the sport, and the numerous overturns we experienced seemed to form no small share of the amusement of the party, but on one occasion, when I had been thrown from my seat and almost buried in the snow, a fat Indian woman drove her sledge over me, and sprained my knee severely.

On the 18th at eight in the evening a beautiful halo appeared round the sun when it was about 8° high. The colours were prismatic, and very bright, the red next the sun.

On the 21st the ice in the river was measured, and found to be

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five feet thick, and on the same day in setting the nets in Round Rock Lake, the ice there was ascertained to be six feet and a half thick, the water being six fathoms deep. The stomachs of some fish were at this time opened by Dr. Richardson, and found filled with insects which appear to exist in abundance under the ice during the winter.

On the 22d a moose-deer was killed at the distance of forty-five miles, and St. Germain went for it with a dog sledge, and returned with unusual expedition on the morning of the third day. This supply was soon exhausted, and we passed the 27th without eating, and had a prospect of fasting a day or two longer, when old Keskarrah entered with the unexpected intelligence of his

having killed a deer. It was divided betwixt our own family and the Indians, and during the night a seasonable supply arrived from Akaitcho. Augustus returned with the men who brought it, much pleased with the attention he had received from the Indians during his visit to Akaitcho.

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ed of snow. On the 7th the sides of the hills began to appear bare, and on the 8th a large house-fly was seen. This interesting event spread cheerfulness through our residence and formed a topic of conversation for the rest of the day.

On the 9th the approach of spring was still more agreeably confirmed by the appearance of a merganser and two gulls, and some loons, or arctic divers, at the rapid. This day, to reduce the labour of dragging meat to the house, the women and children and all the men except four, were sent to live at the Indian tents.

The blue-berries, crow-berries, eye-berries, and cran-berries, which had been covered, and protected by the snow during the winter, might at this time be gathered in abundance, and proved indeed a valuable resource. The ground continued frozen, but the heat of the sun had a visible effect on the vegetation; the sap thawed in the pine-trees, and Dr. Richardson informed me that the mosses were beginning to shoot, and that the calyptrae of some of the jungermanniæ were already visible.

On the 11th Mr. Wentzel returned from the Indian lodges, having made the necessary arrangements with Akaitcho for the drying of meat for summer use, the bringing of fresh meat to the fort, and the procuring a sufficient quantity of the resin of the spruce-fir, or as it is termed by the voyagers *gum*, for repairing the canoes previous to starting, and during the voyage. By my desire he had promised payment to the Indian women who should bring in any of the latter article, and had sent several of our own men to the woods to search for it. At this time I communicated to Mr. Wentzel the mode in which I meant to conduct the journey of the approaching summer. Upon our arrival at the sea, I proposed to reduce the party to what would be sufficient to man two canoes, in order to lessen the consumption of provisions during our voyage, or journey along the coast; and as Mr. Wentzel had expressed a desire of proceeding no further than the mouth of the Copper-Mine River, which was seconded by the Indians, who

wished him to return with them, I readily relieved his anxiety on this subject; the more so as I thought he might render greater service to us by making deposits of provision at certain points, than by accompanying us, through a country which was unknown to him, and amongst a people with whom he was totally unacquainted. My intentions were explained to him in detail, but they were of course to be modified by the circumstances that might occur.

On the 14th a robin appeared; this bird is considered by the natives as the infallible precursor of warm weather. Ducks and geese were also seen in numbers, and the rein-deer advanced to the northward. The merganser, which preys upon small fish, was the first of the duck tribe that appeared; next came the teal, (*anas crecca*), which lives upon small insects that abound in the waters at this season; and lastly the goose, which feeds upon berries and herbage. Geese appear at Cumberland House, in latitude 51°, usually about the 12th of April; at Fort Chipewyan, in latitude 59°, on the 25th of April; at Slave Lake, in latitude 61°, on the 1st of May; and at Fort Enterprise, in latitude 64° 28', on the 12th or 14th of the same month.

On the 16th a minor chief amongst the Copper Indians, attended by his son, arrived from Fort Providence to consult Dr. Richardson. He was affected with snow-blindness, which soon yielded to the dropping of a little laudanum into his eyes twice a day. Most of our own men have been affected with the same complaint of late, but it has always yielded in twenty or thirty hours to the same remedy.

On the 21st all our men returned from the Indians, and Akaitcho was on his way to the fort. In the afternoon two of his young men arrived to announce his visit, and to request that he might be received with a salute and other marks of respect that he had been accustomed to on visiting Fort Providence in the spring. I complied with his desire although I regretted the expenditure of ammunition, and sent the young men away with the customary present of powder to enable him to return the salute, some tobacco, vermilion to paint their faces, a comb, and a looking-glass.

At eleven Akaitcho arrived; upon the first notice of his appearance the flag was hoisted at the fort, and upon his nearer approach, a number of muskets were fired by a party of our people.

scenery—or sea-coast views.—The characteristics of these several modes are often blended; but in their simple forms, the first partakes most of *beauty*—the second *introduces grandeur*, on which the third *almost entirely depends*.

(3)

The *river view*, unless indeed the river be very grand, or the country sublime, may be merely a scene of rural pleasure. Flocks and herds may pasture on its banks, with shepherds and herdsmen.

The *lake scene*, in which wilder ideas predominate, rejects these trivial appendages, or changes them for such as are more suited to its dignity. Flocks and herds are by no means unnatural appendages even of such a scene; but banditti, gypsies, soldiers, or other wild characters, are more accommodated to it.

In *coast scenery*, which is the chief subject of the following work, if its character be preserved distinct, the ideas of grandeur rise very high. Winding bays—views of the ocean—promontories—rocks of every kind and form—estuaries—mouths of rivers—*islands—shooting peninsulas—extensive sandbanks*; and all these adorned occasionally with castles—light-houses—distant towns—towers—harbours—all the furniture of navigation, and other incidental circumstances which belong to sea-coasts, form a rich collection of grand and picturesque materials.

To all these circumstances of grandeur in the *coast view* (to which the lake has little

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pretension) we may add those vast masses of light and shade which the ocean exhibits; and which often spreading many leagues unbroken and undisturbed, yet gradually fading away, give instances of grandeur which no land illumination can reach. To this we may add the brilliant hues, which are continually playing on the surface of a quiet ocean. Beautiful, no doubt, in a high degree are those glimmering tints which often invest the tops of mountains: but they are mere corruscations compared with these marine colours, which are continually varying and shifting into each other in all the vivid

OBSERVATIONS

ON THE COASTS OF

HAMPSHIRE, SUSSEX, AND KENT,

RELATIVE CHIEFLY TO

PICTURESQUE BEAUTY:

MADE IN THE SUMMER OF THE YEAR 1774.

By WILLIAM GILPIN, M.A.

PREBENDARY OF SALISBURY,
AND VICAR OF BOLDRE NEAR LYNGTOWN

LONDON:

PRINTED FOR T. CADELL AND W. DAVIES, IN THE STRAND.

1804.

(2)

smoothness to roughness, and transparency to opacity. It accommodates itself also, with the same ease, to every form of country by the various shapes which its flexibility assumes. On the *plain* it rolls majestically along, in the form of a deep-winding river. In a *mountainous country* it becomes sometimes a lake, sometimes a furious torrent broken among shelves and rocks; or it precipitates itself in some headlong cascade. Again, when it goes to sea, it sometimes covers half a hemisphere with molten glass; or it rolls about in awful swells: and when it approaches the shore it breaks gently into curling waves, or dashes itself into foam against opposing promontories.

Water, therefore, is one of the grand accompaniments of landscape. So essential is it in adorning a view, that some of the most pleasing compositions fall under one or other of these three heads, *river scenery—lake*

splendour of the rainbow, through the space often of several leagues.

To these grand ideas, which accompany the *stillness* of the ocean, we may add the sublimity of *storms*. A raging sea, no doubt, breaks the *uniformity of light and colour*; and destroys, of course, that grandeur in the ocean which arises from *the continuation of the same idea*. But it substitutes another species of grandeur in its room. It substitutes immense masses of water, rising in some parts to an awful height, and sinking in others into dark abysses; rolling in vast volumes clash-

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ing with each other; then breaking and flashing light in every direction. All this is among the grandest exhibitions that water presents.

Now every circumstance of grandeur which generally accompanies a sea-coast view may

be found, I should suppose, in one part or other of the shores of Britain. Its bays, rocks, and promontories are particularly picturesque. More magnificent they may be in Norway and other northern regions. But magnificence, when carried into *disproportion*, is carried too far for picturesque use. The human eye is capable only of comparing objects within a given circumference. It may indeed bring the largest within the sphere of vision by removing them to a proper distance. But this must necessarily diminish their grandeur.

On the whole, therefore, the coasts of this island, perhaps, especially its northern parts, are equal to any other in that species of grandeur which is *most suited to picturesque use*. I have heard indeed that the coasts of the Mediterranean, of the Egean, and other seas, which are less buffeted by raging storms than ours, have *more beauty*. And this may

OBSERVATIONS,
RELATIVE CHIEFLY TO
PICTURESQUE BEAUTY,
Made in the YEAR 1772,
On several PARTS of ENGLAND;
PARTICULARLY THE
MOUNTAINS, AND LAKES
OF
CUMBERLAND, AND WESTMORELAND.

SECOND EDITION.

VOL. I.

By WILLIAM GILPIN, M. A.

PREFENDARY OF SALISBURY;

AND

VICAR OF BOLDRE, IN NEW-Forest, NEAR LYMNINGTON.

L O N D O N;
PRINTED FOR R. BLAMIRE, STRAND.
M.DCC.LXXXVIII.

The village of Nuncham, through which the road passes, was built by Lord Harcourt for his cottagers; and with that regularity, which perhaps gives the most convenience to the dwellings of men. For this we readily relinquish the picturesque idea.

Indeed I question, whether it were possible for a single hand to build a picturesque village. Nothing contributes more to it, than the various styles in building, which result from the different ideas of different people. When all these little habitations happen to unite harmoniously; and to be connected with the proper appendages of a village—a winding road—a number of spreading trees—a rivulet with a bridge—and a spire, to bring the whole to an apex;—the village is compleat.

Nuneham-house stands a little out of the London road, about six miles from Oxford. The old family-seat of Stanton-Harcourt, where Pope, and Gay led the muses, is now a deserted ruin. Its situation was vile, compared with

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that of the present house; which commands, from a rising ground, an extensive prospect over all the intervening flat, as far as the towers of Oxford. In another direction it overlooks the windings of the Thames towards Abingdon. These grand views, terminated by the Berkshire hills, and other rising grounds, compose the distance; and are presented from different places around the house; particularly from a terrace, which extends at least a mile. The accompaniment also of noble trees on the foreground sets off the distant scenery to great advantage.

One of the most striking features in these scenes, is the parish-church, which was designed by Mr. Stuart in the form of a Grecian temple of the Ionic order.

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About half a mile beyond this arch is reared a triumphal column; which, tho much criticized, I own, gives me no offence; but rather seems to carry on the idea of grandeur. The top is

crowned with the statue of the duke of Marlborough; and the pedestal is inscribed—not indeed with the terseness of a Roman altar—but with the less classical, tho more honourable detail of an act of parliament; granting the manor of Woodstock to the duke for his eminent services.

All this scenery before the castle, is now new-modelled by the ingenious Mr. Brown, who has given a specimen of his art, in a nobler style, than he has commonly displayed. His works are generally pleasing; but here they are great.

About a mile below the house, he has thrown across the valley, a massy head; which forms the rivulet into a noble lake, divided by the bridge, (which now appears properly with all the grandeur of accompaniments) into two very extensive pieces of water. Brown himself used to say, “the Thames would never forgive what he had done at Blenheim.”

(40)

The garden consists only of a few acres; and is laid out by Brown in a close walk, which winds towards the river; and, somewhat awkwardly, reverts into itself; taking no notice, except in one single point, of the noble pile it invests.

The armour, and tilting spear of the celebrated Guy, earl of Warwick, a rib of the dun cow, and other monuments of the prowess of that hero, are shewn at the porter's lodge. These remains, (tho fictitious, no doubt), are not improper appendages of the place; and give the imagination a kind of tinge, which throws an agreeable, romantic colour on all the vestiges of this venerable pile.

Since these remarks were made, Warwick-castle hath received great improvement. The whole house hath undergone a thorough repair; and hath been intirely new-furnished, in a style suitable to the magnificence of the place. But its richest furniture is a choice collection of portraits by Rubens, and Vandyke.

The ancient baronial castle was a sort of insulated, independent state. Compleat in itself, it scorned any connection with the country.

The *cascade*, which is the next object of our observation, may be divided into the *broken*, and the *regular* fall.

The *first* belongs most properly to the rock; whose projecting fragments, impeding the water, break it into pieces—dash it into foam—and give it all the spirit, and agitation, which that active element is capable of receiving.—Happy is the pencil, which can seize the varieties, and brilliancy of water under this circumstance.

In the *regular* fall the water meets no obstruction; but pours down, from the higher grounds to the lower, in one splendid sheet.

Each kind hath its beauties; but, in general, the *broken* fall is more adapted to a small

body of water; and the *regular* to a large one. The small body of water has nothing to recommend it, but its variety and bustle: whereas the large body has a natural dignity of character, that supports it. To fritter it in pieces would be to destroy in a degree the grandeur of its effect. Were the Niagara thus broken, at least if some considerable parts of it were not left broad and sheeted, it might be a grand scene of confusion; but it could not be that vast, that uniform, and simple object, which is most capable of expressing the idea of greatness.

As there are few *considerable* rivers in the romantic country, we are now examining, the most beautiful cascades, (which are innumerable) are generally of the *broken* kind. The *regular* falls (of which also there are many) are objects of little value. Tho they are sometimes four or five hundred feet in height; yet they appear only like threads of silver at a distance; and like mere spouts at hand; void both of grandeur, and variety.—And yet, in heavy rains, some of them must be very noble, if we may judge from their channels, which often shew great marks of violence.—But I was never fortunate enough to see any of them in these moments of wildness.

These two kinds of cascades, the *broken*,

and the *regular*, may be combined. If the weight of water be small, it is true, it will admit only the *broken* fall: but if it be large, it may with propriety admit a combination of both: and these combinations may be multiplied into each other with endless variety.

The *regular* fall admits also another mode of variety by forming itself into what may be called the *successive* fall; in which the water, instead of making one continued shoot, falls through a succession of different stories. Of this kind are many of the mountain-cascades in this country, which are often very beautiful; especially where the stages are deranged; and the water *seeks* its way from one stage to another.

OBSERVATIONS,

RELATIVE CHIEFLY TO

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MOUNTAINS, AND LAKES

OF

CUMBERLAND, AND WESTMORELAND,

SECOND EDITION.

V O L. II.

By WILLIAM GILPIN, M. A.

PREBENDARY OF SALISBURY;

AND

VICAR OF BOLDRE, IN NEW-FOREST, NEAR LYMINGTON.

L O N D O N;

PRINTED FOR R. BLAMIRE, STRAND,

M.DCC.LXXXVIII.

The vale of Lorton is of the extended kind, running a considerable way between mountains, which range at about a mile's distance. They are near enough to screen it from the storm; and yet not so impending as to exclude the sun. Their sides, tho not smooth, are not much diversified. A few knolls and hollows just give a little variety to the broad lights and shades, which over-spread them.

This vale, which enjoys a rich soil, is in general a rural, cultivated scene; tho in many parts the ground is beautifully broken, and abrupt. A bright stream, which might almost take the name of a river, pours along a rocky channel; and sparkles down numberless little cascades. It's banks are adorned with wood; and varied with different objects; a bridge; a mill; a hamlet; a glade over-hung with wood; or some little sweet recess; or natural vista, through which the eye ranges, between irregular trees, along the windings of the stream.

Except the mountains, nothing in all this scenery is *great*; but every part is filled with those sweet engaging passages of nature, which

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tend to sooth the mind, and instill tranquillity.

———The passions to divine repose
Persuaded yield: and love and joy alone
Are waking: love and joy, such as await
An angel's meditation———

Scenes of this kind, (however pleasing) in which few objects occur, either of *grandeur* or *peculiarity*, in a singular manner elude the powers of verbal description. They almost elude the power of colours. The soft and elegant form of beauty is hard to hit: while the strong, harsh feature is a mark, which every pencil can strike.

But, tho a *peculiar* difficulty attends the verbal description of these mild, and quiet haunts of Nature; yet undoubtedly *all* her scenery is ill-attempted in language.

Mountains, rocks, broken ground, water,

and wood, are the simple materials, which she employs in all her beautiful pictures: but the variety and harmony, with which she employs them are infinite. In description these words stand only for *general ideas*:

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Moral, and picturesque ideas do not always coincide. In a moral light, cultivation, in all it's parts, is pleasing; the hedge, and the furrow; the waving corn field, and rows of ripened sheaves. But all these, the picturesque eye, in quest of scenes of grandeur, and beauty, looks at with disgust. It ranges after nature, untamed by art, and bursting wildly into all it's irregular forms.

———Juvat arva videre
Non rastris hominum, non ulli obnoxia curæ.

It is thus also in the introduction of figures. In a moral view, the industrious mechanic is a more pleasing object, than the loitering peasant. But in a picturesque light, it is otherwise. The arts of industry are rejected; and even idleness, if I may so speak, adds dignity to a character. Thus the lazy cowherd resting on his pole; or the peasant loling on a rock, may be allowed in the grandest scenes; while the laborious mechanic, with his implements of labour, would be repelled.

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The fisherman, it is true, may follow his calling upon the lake: but he is indebted for this privilege, not to his art; but to the picturesque apparatus of it—his boat, and his nets, which qualify his art. They are the objects: *he* is but an appendage. Place him on the shore, as a single figure, with his rod, and line; and his art would ruin him. In a cheerful glade, along a purling brook, near some mill, or cottage, let him angle, if he please: in such a scene the picturesque eye takes no offence. But let him take care not to introduce the vulgarity of his employment in a scene of grandeur.

At the same time, we must observe, that figures, which thus take their importance

merely from not mixing with low, mechanic arts, are at best only *picturesque appendages*. They are of a negative nature, neither adding to the grandeur of the idea, nor taking from it. They merely and simply *adorn* a scene.

The characters, which are most *sui-tes* to these scenes of grandeur, are such as impress us with some idea of greatness, wildness, or ferocity; all which touch on the sublime.

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Figures in long, folding draperies; gypsies; banditti; and soldiers,—not in modern regimentals; but as Virgil paints them,

——longis adnixi hastis, et scuta tenentes;

are all marked with one or other of these characters: and mixing with the magnificence, wildness, or horror of the place, they properly coalesce; and reflecting the same images, add a deeper tinge to the character of the scene.

For the truth of all these remarks I might appeal to the decisive judgment of Salvator Rosa; who seems to have thoroughly studied propriety in figures, especially in scenes of grandeur. His works are a model on this head. We have a book of figures, particularly composed for scenery of this kind, and etched by himself. In this collection there is great variety, both in the characters, groups, and dresses: but I do not remember, either there, or in any other of his works, a low, mechanic character. All his figures are either of (what I have called) the *negative* kind; or marked with some trait of *greatness*, *wildness*, or *ferocity*. Of this last species his

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figures generally partook: his grand scenes being inhabited chiefly by banditti.

I met with a passage, not a little illustrative of these remarks on figures, in the travels of Mr. Thicknes through Spain.

“The worst sort of beggars, says he, in Spain are the troops of male, and female gypsies. They are of the genuine breed, and differ widely from all other gypsies; and I

may say, from all other human beings. I often met troops of these people; and when an interview happens in roads very distant from towns, or dwellings, it is not very pleasing: for they ask, as if they knew they were not to be refused; and I dare say often commit murders, when they can commit them by surprise. They are extremely swarthy, with hair as black as jet; and form very picturesque groups under the shade of the rocks and trees of the Pyrenean mountains, where they spend their evenings: and live suitably to the climate; where bread, and water, and idleness, are preferable to better fare, and hard-labour.”

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[Marlborough-moor]

[Sir Richard Graham]

carried into his chamber: and Cromwell found his wretched lady weeping over the mangled corpse of her husband, yet scarce cold.

Such a sight, one would have imagined, might have given him—not indeed an emotion of pity—but at least a satiety of revenge. The inhuman miscreant still felt the vengeance of his soul unsatisfied; and turning round to his troopers, who had stalked after him into the sacred recesses of sorrow, he gave the sign of havoc; and in a few moments the whole house was torn in pieces: not even the bed was spared, on which the mangled body was extended: and every thing was destroyed, which the hands of rapine could not carry off.

In this country we met with another curious memorial of the battle of Marlborough-moor. A carpenter, about two years ago, bought some trees, which had grown there. But when the timber was brought to the saw-pit, it was found very refractory. On examining it with more attention, it appeared, that great

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numbers of leaden bullets were in the hearts of several of the trees; which thus recorded the very spot, where the heat of the battle had raged.

OBSERVATIONS

ON THE

RIVER WYE,

AND SEVERAL PARTS OF

SOUTH WALES, &c.

RELATIVE CHIEFLY TO

PICTURESQUE BEAUTY:

MADE IN THE SUMMER OF THE YEAR 1770.

By WILLIAM GILPIN, M.A.

PREBENDARY OF SALISBURY,
AND VICAR OF BOLDRE NEAR LYMINGTON.

THE FIFTH EDITION.

LONDON:

Printed by A. Strahan, Printers-Street,
FOR T. CADELL JUNIOR AND W. DAVIES, STRAND.
1800.

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The picturesque eye also, in quest of beauty, finds it almost in every incident and under every appearance of nature. Even the rain gave a gloomy grandeur to many of the scenes; and by throwing a veil of obscurity over the removed banks of the river, introduced, now and then, something like a pleasing distance. Yet still it hid greater beauties; and we could not help regretting the loss of those broad lights and deep shadows which would have given so much lustre to the whole, and which ground like this is in a peculiar manner adapted to receive.

The first part of the river from Ross is tame. The banks are low; and scarcely an object attracts the eye, except the ruins of *Wilton-castle*, which appear on the left, shrouded with a few trees. But the scene wants accompaniments to give it grandeur.

The bank, however, soon began to swell on the right, and was richly adorned with wood. We admired it much; and also the

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vivid images reflected from the water, which were continually disturbed as we sailed past them, and thrown into tremulous confusion by the dashing of our oars. A

disturbed surface of water endeavouring to collect its scattered images and restore them to order, is among the *pretty* appearances of nature.

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From Monmouth we reached, by a late breakfast-hour, the noble ruin of Tintern-abbey, which belongs to the Duke of Beaufort; and is esteemed, with its appendages, the most beautiful and picturesque view on the river.

Castles and abbeys have different situations, agreeable to their respective uses. The castle,

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meant for defence, stands boldly on the hill; the abbey, intended for meditation, is hid in the sequestered vale.

*Ah! happy thou, if one superior rock
Bear on its brow the shivered fragment huge
Of some old Norman fortress: happier far,
Ah! then most happy, if thy vale below
Wash, with the crystal coolness of its rills,
Some mould'ring abbey's ivy-vested wall.*

Such is the situation of *Tintern-abbey*. It occupies a great eminence in the middle of a circular valley, beautifully screened on all sides by woody hills, through which the river winds its course; and the hills, closing on its entrance and on its exit, leave no room for inclement blasts to enter.

Nor is the yew celebrated only for it's toughness, and elasticity; but also for it's durable nature. Where your paling is most exposed either to winds, or springs; strengthen it with a post of old yew. That hardy veteran fears neither storms above, nor damps below. It is a common saying among the inhabitants of New-forest, that a post of yew will outlast a post of iron.

* See Bp. Latimer's sermons. Scrm. VI.

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In the wane of autumn however there are other defects. The ash, and some other trees, have deserted their station in the forest: they have shed their leaves, and left a cheerless blank. — Besides, the verdure of the forest is too much wasted; and the brown, and yellow tints, beautiful as they are, become too predominant: for the prevalence of these hues in autumn, fatigues the eye no less than the prevalence of green in summer. Only indeed the autumnal tints will ever be more varied.

The intermediate time is the season of picturesque beauty; when the greens, and the browns, and the yellows, are blended together by a variety of *middle tints*, which often create the most exquisite harmony.

Of all the hues of autumn, those of the oak are commonly the most harmonious. As it's vernal tints are more varied, than those of other trees; so are it's autumnal. In an oaken wood you see every variety of green, and every variety of brown; owing either to the different exposure of the tree; it's different foil; or it's different nature: but it is not my business to enquire into causes.

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The hues however of the *distant forest*, when most discordant, are often harmonized by the intervening trees on the *foreground*. We can bear the glow of the distant beech-wood, when it is contrasted at hand by a spreading oak, whose foliage hath yet scarce lost it's summer-tint — or by an elm, or an ash, whose fading leaves have assumed a yellowish hue.

REMARKS

ON

Forest Scenery,

AND OTHER

WOODLAND VIEWS,

RELATIVE CHIEFLY TO

PICTURESQUE BEAUTY,

ILLUSTRATED BY

THE SCENES OF NEW FOREST IN HAMPSHIRE.

IN THREE BOOKS.

By WILLIAM GILPIN, A.M.

PREBENDARY OF SALISBURY; AND VICAR OF BOLDRE IN
NEW-FOREST, NEAR LYMINGTON.

Happy he,
Whom what he views of beautiful, or grand,
In nature, from the broad, majestic oak
To the green blade, that twinkles in the sun,
Prompt with remembrance of a present God.
COWPER'S Poems.

THE THIRD EDITION, IN TWO VOLUMES.

VOL. I.

LONDON:

PRINTED FOR T. CADELL AND W. DAVIES, STRAND.
1808.

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After the pine, and fir tribes, the yew deserves our notice. The yew is a pure native of Britain, and was formerly what the oak

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is now, the basis of our strength. Of it the old English yeoman made his long-bow; which, he vaunted, nobody but an Englishman, could bend. In shooting he did not, as in other nations, keep his left hand steady, and draw his bow with his right: but keeping his right at rest upon the nerve, he pressed the whole weight of his body into the horns of his bow*. Hence probably arose the English phrase of *bending a bow*; and the French of *drawing one*.

THREE ESSAYS:

ON

PICTURESQUE BEAUTY;

ON

PICTURESQUE TRAVEL;

AND ON

SKETCHING LANDSCAPE:

WITH A POEM, ON

LANDSCAPE PAINTING.

TO THESE ARE NOW ADDED

TWO ESSAYS,

GIVING AN ACCOUNT OF THE PRINCIPLES AND MODE IN WHICH THE
AUTHOR EXECUTED HIS OWN DRAWINGS.

 BY WILLIAM GILPIN, A.M.

 PREBENDARY OF SALISBURY; AND VICAR OF BOLDRE IN
 NEW-Forest, NEAR LYMINGTON.

THIRD EDITION.

LONDON:

PRINTED FOR T. CADELL AND W. DAVIES, STRAND.

1808.

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View her varied range:

Each form that charms is there; yet her best forms
 Must be *selected*. As the sculptured charms 310
 Of the famed Venus grew, so must thou cull
 From various scenes such parts as best create
 One perfect whole. If Nature ne'er arrayed
 Her most accomplished work with grace compleat,
 Think, will she waste on desert rocks, and dells, 315
 What she denies to Woman's charming form?

And now, if on review thy chalked *design*,
 Brought into form by *Disposition's* aid,
 Displease not, trace thy lines with pencil free;
 Add lightly too that *general mass* of shade, 320
 Which suits the form and fashion of it's parts.
 There are who, studious of the best effects,
 First sketch a flight cartoon. Such previous care

Is needful, where the Artist's fancy fails
 Precisely to foresee the future whole. 325

This done, prepare thy pallet, mix thy tints,
 And call on chaste Simplicity again
 To save her votary from whate'er of hue,
 Discordant or abrupt, may flaunt, or glare.

Yet here to bring materials from the mine, 330
 From vegetable dies, or animal,
 And sing their various properties and powers,
 The muse descends not. To mechanic rules,
 To prose, and practice, which can only teach
 The use of pigments, she resigns the toil. 335

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One truth she gives, that Nature's simple loom
 Weaves but with three distinct, or mingled, hues,
 The vest that cloaths Creation. These are red,
 Azure, and yellow. Pure and unstained white
 (If colour justly called) rejects her law, 340
 And is by her rejected. Dost thou deem
 The glossy surface of yon heifer's coat
 A perfect white? Or yon vast heaving cloud
 That climbs the distant hill? With ceruse bright
 Attempt to catch it's tint, and thou wilt fail. 345
 Some tinge of purple, or some yellowish brown,
 Must first be blended, e'er thy toil succeed.
 Pure white, great Nature wishes to expunge
 From all her works; and only then admits,
 When with her mantle broad of fleecy snow 350
 She wraps them, to secure from chilling frost;
 Conscious, mean while, that what she gives to guard,
 Conceals their every charm: the stole of night
 Not more eclipses: yet that fable stole
 May, by the skilful mixture of these hues, 355
 Be shadowed even to dark Cimmerian gloom.

Draw then from these, as from three plenteous springs,
 Thy brown, thy purple, crimson, orange, green,
 Nor load thy pallet with a useless tribe
 Of pigments: when commix'd with needful white, 360
 As suits thy end, these native three suffice.
 But if thou dost, still cautious keep in view
 That harmony which these alone can give.

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336 One truth she gives, &c. From these three
 virgin colours, red, blue, and yellow, all
 the tints of nature are composed. Greens

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of various hues, are composed of blue,
 and yellow: orange, of red, and yellow:
 purple and violet, of red, and blue. The

tints of the rainbow seem to be composed also of these colours. They lie in order thus; violet—red—orange—yellow—green—blue—violet—red: in which assortment we observe that orange comes between red, and yellow; that is, it is composed of those colours melting into each other. Green is in the same way composed of yellow and blue; and violet, or purple of blue, and red. Nay even browns of all kinds may, in a degree, be effected by a mixture of these original colours: so may grey; and even a kind of black, tho not a perfect one.—As all pigments however are deficient, and cannot approach the rainbow colours, which are the purest we know, the painter must often, even in his splendid tints, call in different reds, blues, and yellows. Thus as vermillion, tho an excellent red on many occasions, cannot give a rosy, crimson hue, he must often call in lake, or carmine.

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THE

BIRDS OF LONG ISLAND.

BY J. P. GIRAUD, JR.,

MEMBER OF THE LYCEUM OF NATURAL HISTORY, NEW-YORK, CORRESPONDING
MEMBER OF THE ACADEMY OF NATURAL SCIENCES, PHILADELPHIA, &c.

NEW-YORK:

PUBLISHED BY WILEY & PUTNAM, 161 BROADWAY.
Tobitt's Print, 9 Spruce st.
1844.

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The Screech Owl is found in almost every part of the United States. In the Southern States it is quite rare. Mr. Audubon states that during a long residence in Louisiana he met with but two specimens. With us it is very common; it is usually found in the woods and orchards; its food is chiefly mice and small birds.

One of the few errors made by the lamented Wilson, was in describing the young of this bird as a distinct species. Considering all the disadvantages under which he labored, it is surprising that in his excellent work so few mistakes should have occurred. Had he lived to complete his laudable, and at that period (in this country) novel undertaking, no doubt the corrections that have fallen to the task of others, would have been made with his own pen.

From the very satisfactory observations made by the distinguished author of the *Birds of America*, I supposed it to be a received opinion among Ornithologists, that the young of the Screech Owl is red. In a recent publication, the author has described the bird in red livery as a distinct species, and has stated that the young of the Screech Owl is of similar color as the adult. Shortly after this publication, I received from J. G. Bell, of Rockland County, the following communication:

*Copy of the
in the collection.*

"DEAR SIR—

"In looking over Mr. Nuttall's late edition of the Land Birds, I notice that he has, on the authority of Dr. Michener, repeated, in my opinion, the error committed by Wilson, by describing the Red Owl, *Strix naevia* of Wilson, as a distinct species, which I consider as the young of *Strix asio*. This opinion I have not hastily arrived at—it is the result of several years' close observation. I have taken the young birds from the nest soon after they were hatched, and found them covered with grayish down. As soon as the feathers begin to form, they assume a reddish appearance, the color becoming deeper as the bird advances in age. How long they remain in this plumage I cannot say, but am inclined to the opinion that in some instances they do not appear in full plumage until the second or third year—as I have taken the female from the nest, she being in mature gray plumage, and at the same time I have shot the male, he being perched a few feet above her on the same tree, and in the red livery. On the first occurrence of this, I supposed the plumage of the female to be gray, and that of the male red. Subsequently, however, I was obliged to abandon this position, for directly the opposite occurred; and I have shot both male and female in either dress, and am well persuaded that they mate before arriving at maturity.

Yours truly,

J. G. BELL."

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TURDUS WILSONII—BONAP.

WILSON'S THRUSH.

Tawny Thrush, *Turdus mustelinus*, Wils. Amer. Orn.
Turdus Wilsonii, Bonap. Syn.
Merula minor, (Swainson) Little Tawny Thrush, Sw. & Rich.
Wilson's Thrush, or Veery, *Turdus Wilsonii*, Nutt. Man.
Tawny Thrush, *Turdus Wilsonii*, Aud. Orn. Biog.

Specific Character—Adult with the entire upper parts including the tail feathers uniform tawny brown; fore neck and a small portion of the breast, pale yellowish-brown, marked with spots of darker brown; sides of the body ash; rest of the lower parts grayish-white. Length seven inches, wing four.

This species was first described by Wilson. He states that it makes its appearance in Pennsylvania from the South about the beginning of May, stays a week or two, and passes on to the northern and high mountainous districts to breed. It visits us in the spring, and continues with us during the summer. Although not possessing the solitary habits of the former, it is by no means sociable, being rather shy and timid. It resorts to the shady woods, where it passes the most of its time on the ground, searching for insects, which form the chief part of its food. Its note is a sharp chirrup, occasionally in a strain approaching a song.

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TURDUS MINOR—GMEL.

HERMIT THRUSH.

Hermit Thrush, *Turdus solitarius*, Wils. Amer. Orn.
Hermit Thrush, *Turdus minor*, Aud. Orn. Biog.
Turdus minor, Bonap. Syn.
Little or Hermit Thrush, *Turdus minor*, Nutt. Man.
Merula solitaria, Hermit Thrush, Sw. & Rich.

Specific Character—Adult with the upper parts deep olive brown; rump, upper tail coverts and tail brownish-red; throat, fore neck and fore part of the breast approaching to cream color, and marked with brownish-black spots, which become more faint on the lower part of the breast, which, with the abdomen is white; lower tail coverts and sides of the rump pale buff; the sides of the body

tinged with olive. Length seven inches, wing three and three quarters.

In the Southern States the Hermit Thrush is a constant resident. About the middle of May it arrives on Long Island, and takes up its abode during the summer in the deep and shady parts of the woods. It is generally seen alone, hopping about on the ground, or among the low bushes, in search of berries, on which it feeds, or perched on a low bough uttering its plaintive note. By a casual observer this species might be mistaken for the Wood Thrush, which it somewhat resembles in plumage. It can, however, be readily distinguished by its smaller size. The plumage is duller, and it differs in its manners. At times the Hermit Thrush is heard chanting a low and musical song, but it is destitute of those sweet, clear and rich tones which characterise the song of the Wood Thrush. Its nest is usually placed on low branches, and is formed of grass and weeds of different kinds, with great attention to the neatness of the interior. The eggs, from four to five and sometimes six in number, are pale greenish blue, spotted with olive.

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The Snow Bunting inhabits during summer the northern regions of both continents, migrating at the approach of winter to warmer parts. According to Montagu, "these birds appear in the north of Scotland in large flocks during winter, and some few are said to breed upon the highest mountains with the *Parmigans*; but in the south of England it is rarely seen."

On Long Island, as in other parts of the middle districts of the United States, it arrives in the early part of December. It is extremely hardy, and prefers the colder climates of both hemispheres, its migrations depending entirely on the supply of food, which to obtain it has sometimes proceeded in the U. States as far south as Maryland. On its first arrival it is very lean, but soon becomes fat from feeding on the seeds of dried rank weeds and withered grasses. When in good condition its flesh is much esteemed; it graces the table of the epicure, and by some of its admirers it is termed *Ortolan*, but it is more generally known by the name of "White Snow Bird." The Snow Bunting inhabits situations similar to the Lark, like which it displays much activity when collecting its food, and is often seen running with great nimbleness. It alights on fence-rails, the roofs of the out-buildings, and if a convenient opportunity offers, enters the barn, and picks up the refuse seeds. It seldom alights on trees, but occasionally on starting a flock, it will rise and settle on a near tree, in the manner of the common Snow Bird. This species keep in flocks, and when migrating, fly in close bodies and at a considerable elevation. On Mount Saddleback, one of the highest peaks in the State of Massachusetts, Mr. Edwards—from whom I have received the eggs—informed me, that in company with others, he found, in the month of July, eleven nests. They were placed on the ground, and formed chiefly of dry grass, lined with hair, the eggs, four in number, are thirteen-sixteenths of an inch long, dull white, spotted and marked with reddish-brown, which markings are darker and confluent at the great end.

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EMBERIZA SAVANNA—BONAP.

SAVANNAH BUNTING.

Savannah Finch *Fringilla savanna*, Wils. Amer. Orn.
Fringilla savanna, Bonap. Syn.
Savannah Sparrow, *Fringilla savanna*, Nutt. Man.
Savannah Finch, *Fringilla savanna*, Aud. Orn. Biog.

Specific Character—A yellow line from the nostril over the eye; medial band the same color, but paler; shoulders of the wings

white. Adult with the upper parts light grayish-brown, streaked with dusky; upper part of the head dusky brown, with a narrow pale yellow band; a line over the eye yellow; a line of dusky from the bill down the sides of the neck; a similar marking on the sides of the throat, which, with the fore neck, a portion of the breast, and sides of the body, are streaked with dusky; rest of the lower parts white; quills dark brown, the secondaries and their coverts broadly edged with lighter brown; tail feathers dark brown, edged with dull white. Length five inches and a half, wing two and five-eighths.

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EMBERIZA PASSERINA—WILSON.

YELLOW-WINGED BUNTING.

Yellow-winged Sparrow, *Fringilla passerina*, Wils. Amer. Orn.
Fringilla passerina, Bonap. Syn.
 Yellow-winged Sparrow, *Fringilla passerina*, Aud. Orn. Biog.

Specific Character—Bill very stout; loreal band yellow; medial band dull yellowish-white; wing at shoulder bright yellow; tail emarginate, the feathers narrow and pointed. Adult with the upper part of the head dusky, intermixed with grayish-white; a ring round the eye and a band behind the eye of the same color; medial band yellowish-white; a band from the nostrils to the eye yellow; hind neck ash gray, intermixed with dusky; back brownish-black, marked with bright chestnut; quills and tail feathers dark brown, margined with dull white; inner secondaries and their coverts darker and more broadly margined; edges of the wings at flexure bright yellow; sides of the neck, breast, lower tail coverts, and sides of the body, pale yellowish-gray, with a few touches of dusky on the latter; throat grayish-white. Length four inches and three quarters, wing two and a half.

This species can be readily distinguished from the former by the difference in the coloring of the lower parts, which in this bird are pale yellowish-gray, those parts of the preceding being white, with the fore part of the breast and sides streaked with dusky, the yellow line over the eye more extensive, and the tail feathers are narrower and more pointed. The favorite resort of the Yellow-winged Bunting is the grass-fields—more especially the clover—where, sitting on a stone or stump, it is observed sitting for hours together, singing cheerfully and pleasantly. It is quite a common species, and was first introduced to notice by Wilson. The nest, which is formed of loose, dry grass, and lined with hair and fibrous roots, is placed on the ground; the eggs, five in number, are grayish-white, sprinkled with brown.

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NYPHÆA HYEMALIS—LINN.

COMMON SNOW BIRD.

Snow Bird, *Fringilla nivalis*, Wils. Amer. Orn.
Fringilla hyemalis, Bonap. Syn.
Fringilla hyemalis, Black Finch, Sw. & Rich.
 Common Snow Bird, *Fringilla Hudsonia*, Nutt. Man.
 Snow Bird, *Fringilla hyemalis*, Aud. Orn. Biog.

Specific Character—Head, neck all round, back, fore part of the breast and sides grayish-black; abdomen white; wings and tail feathers black, the quills margined externally with dull white; the outer two tail feathers white—a spot of the same color on the third next to the shaft, extending an inch or more from the end of the inner web. Female with the plumage lighter, tinged with brown on the neck and head. Length six inches and a quarter, wing three and one-eighth.

About the middle of October these birds appear on Long Island in large flocks. They resort to the open, neglected fields, and are observed along the roadside, feeding on the seeds of various species

of rank, uncultivated plants. It is an exceedingly numerous

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species, and in open winters they remain with us in large numbers until the latter part of April. In severe weather the large majority retire towards the South—though during the coldest weather, even when the ground is covered with deep snow, the trees loaded with ice, and scarcely a vestige of vegetation to be seen, a few remain; at such times they become quite tame, frequent the door-yard, visit the out-buildings, attend the feeding of the cattle for the purpose of collecting the scattered seed, and in addition to their scanty subsistence, approach the threshold, and by their piteous manner ask for charity, when they could join their kindred in more hospitable regions, where food is abundant, and independently obtained.

The Snow Bird spends much of its time on the ground; it also alights on trees and fence-rails, and like the Chipping Bunting and other familiar species, visits the towns and villages, and is not unfrequent in the private gardens and public grounds of our large cities. When food is readily obtained, it gets quite fat, and is shot and caught in traps of various kinds, and sent to market. It meets with ready sale, and by many persons is considered excellent.

Usually by the first of May, all of this species have departed from the Island, its northward migrations extending to the Fur countries, where it is said that the majority pass the summer.

A few have been found breeding on the Catskill Mountains, and in the woods at Greenbush, opposite Albany, as well as in the more immediate vicinity of that city.

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CROW

Having nothing to recommend it in plumage, unfit for food, and being a notorious pest, this much despised and abundant species would have long since become extinct, were it not for its vigilance and sagacity, which it possesses in a degree unsurpassed by any of the feathered tribe. Its thieving propensities are not only directed against the husbandman, but it delights in robbing the nests of other birds of their eggs, for which it is attacked by the injured party, until compelled to abandon its piratical design. Among its assailants, none are more formidable than the renowned King-bird, from whose fury and courage it seldom escapes without paying dearly for its intrusive visits.

The only redeeming trait of character which we can relate in the history of this mischievous and noisy bird, is the removing of thousands of destructive insects previous to the season of planting. Yet branded an outlaw, it roams about, receiving favor from none, and despised by all.

In the month of April, and sometimes in the latter part of March, the Crow commences building its nest. For this purpose it retires to the woods. The nest, which is formed of a variety of materials, such as sticks, hair, wool, and moss, is usually placed among the higher branches of the tallest trees; the eggs, which are four, and sometimes five in number, are of a brown color, tinged with green, and marked with small spots and blotches of blackish-brown. During the time of hatching, the male is very attentive to his mate—and occasionally shares with her the task of incubation. From the time it commences preparing its nest until the young are able to fly, its loud and coarse cry is seldom heard—no doubt adopting this silent manner that its nest may escape observation.

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The flight of the Partridge is performed by a quick flapping of the wings, and it is capable of sustaining itself in the air for a considerable time. There is a notion prevailing among some of our sportsmen that the Partridge is not capable of continuing its flight

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over thirty or forty rods without alighting, and in conversation they

have illustrated their remarks by stating that they had seen it, when attempting to cross a stream not over half a mile wide, fall in and perish. Such occurrences may have taken place when families were about changing their location. The younger birds becoming tired, have induced the older ones to alight with them, and not being able to arise from the water, nor having sufficient strength to swim to the shore, have perished. In autumn, after the crops are gathered, it gets in fine condition from feeding on the scattered seeds; its flight is then strong and swift, and at this season it requires an active gunner to shoot it. I think I can say with certainty, that I have seen it move off at least one mile without halting, judging from the ground I went over before putting it up again.—

The gun is not the only means used for its destruction; traps and snares of various kinds are set all over the Island, by persons who are eager to profit by the ready sale of these resident birds. Its flesh is white, tender, and rather dry, and in general highly esteemed, though as game it is quite inferior to the Woodcock or Wilson's Snipe. In severe winters it suffers by deep snows, and at such times it becomes quite tame, approaches the barn, and shares with the poultry. A few years since, a bevy of sixteen was in daily attendance at the farm at which I was staying. They were fed with corn and wheat, of which they are fond, as well as buckwheat, berries, and insects. In a few days they became very familiar, walked into the barn, and ran about the floor to pick up the refuse grain. After having made their repast, they went to roost on the snow, at a short distance from where they were fed, with apparently as little timidity as the domestic fowls. When roosting, they adopted the form of a ring, with their heads out, and lying thus in a close body, received the mutual warmth of each other.

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The Ruffed Grouse is capable of rapid flight. In the autumn of 1839, while two of my friends were in pursuit of the American Partridge, their dog put up a Ruffed Grouse. Both gentlemen fired at the same instant—and seeing the bird lodge in a tree, both claimed the prize—each supposing that his shot had taken effect. On arriving at the spot, they found the bird impaled on a small dry branch, without having received a single pellet. On one other occasion, a gentleman started a Grouse near Weehawken, New Jersey; before he could fire, the bird dropped dead—on taking it up, he found the skull broken, it having flown against a limb of a tree with such force as to produce instant death.

Its food consists of seeds and berries of various kinds. During winter, when the ground is covered with snow, it resorts to the orchards, and feeds on the buds of apple trees. I have frequently heard it stated, that at the season mentioned above, when the Ruffed Grouse is "budding," as it is termed, six or eight, or as many as should alight on the same tree, could be successively killed, by commencing with the lowermost one. This I have as frequently heard contradicted, and shall offer my own observations on the subject. Several years since, while spending a winter in the northern part of Massachusetts, a section of country where this species abound, I devoted a large portion of my time to Grouse-shooting.—On the farm where I was residing, there was an extensive apple-orchard, situated at the foot of a mountain. During a deep snow, large numbers of the present species of Grouse, would early in the morning, and again toward evening, descend from the mountain on the trees in the orchard, for the purpose of procuring the birds. Hither I repaired, for the purpose of obtaining the desired game; and having heard my host speak of shooting from ten to twelve from one tree, by taking them in rotation, I of course reckoned on rare sport—and was not a little disappointed on finding, that after having shot one or two, the rest had flown to their secure retreat in the mountain. Communicating the result to my host, he questioned me as to the mode of procedure—and then informed me,

that instead of walking through the orchard after the birds had

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settled on the trees, or after having shot one down, advance to take it up, I should take my station in the orchard before they commenced flying—placing myself where I should be least likely to be observed, in such a position that I could load and fire without rising, and let those that I shot lie till the sport was over. With these instructions, at an early hour on the following morning, I again repaired to the orchard—and the result proved satisfactory. When alighting on the tree, they appear exceedingly timid, and spend several minutes in looking widely around them. Not seeing any thing to excite suspicion, they commence filling their crops with the buds—and after waiting until they become fairly engaged in collecting their food—then, by commencing with the lowermost one, all on the tree can be successively shot. At the report of the gun, those above your mark merely start—do not quit the tree—but immediately recommence their occupation. This manner of shooting I do not recommend, nor would I practice it; at the present day it is unsportsmanlike—and at such times, from the scarcity of food, the birds are in very poor condition.

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When flushed, the Woodcock rises to the height of the bushes or undergrowth, and quickly drops behind them again, usually running a short distance as soon as it touches the ground. Being very tender but little force is required to kill it, and as it presents only a momentary mark, none but practised sportsmen can succeed.

I once heard a gentleman boast of having a day of fine sport in cover, which was so close, that in the ordinary mode of shooting from the shoulder, he could not have bagged a bird. He shot from the hip—a mode but little practised among us. I have heard sportsmen assert that they have shot three species of Woodcock. These differences are attributable to sex and age.

The whistling noise when rising, is produced by the action of its wings. Its note is a sudden quack, which is not often heard except in spring, when at that season toward dusk it mounts in the air, uttering whistling notes, which are continued till a late hour during evening. In its habits, it is said to be allied to the European Woodcock. On comparing the two species, I find the European bird to be much larger, with the lower parts dull yellowish-white, and barred with black; while those parts of our bird are light red without the black markings.

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The Common Tern arrives on the shores of Long Island about the middle of April, and continues in great numbers until the approach of winter, when they all retire beyond the southern limits of the Union. It is a noisy, restless bird; passes most of its time in the air, coursing over the beach and meadows in search of insects, or skimming swiftly over the surface of the water in pursuit of small fishes, which it sometimes seizes without apparently checking its flight. At other times it is observed hovering over a shoal of fry—the instant they appear at the surface, it dashes headlong, falling like a weight upon its prey, submerging the head in the effort. It never dives, and although web-footed, is seldom seen swimming, and seems to have an aversion to alight on the water. At the reflux of the tide, it resorts to the bars and shoals, mingling with the Gulls, gleaning minute shell-fish and marine insects which abound in such places. It is of a lively, sociable disposition, moving about in parties, and keeping up a continual chattering. It also appears to have a fondness for the society of the Black-headed Gull—with which it is often seen associated, and, like its companion, though not pursued by the gunner, is extremely timid and watchful; but when any of their number meet with accident, those within hearing of its shrill cry flock to the spot, and hover round their wounded companion until driven off by the repeated discharge of the sportsman's gun.

HUNTING ADVENTURES

IN THE

NORTHERN WILDS;

OR,

A TRAMP IN THE CHATEAUGAY WOODS, OVER HILLS,
LAKES, AND FOREST STREAMS.

BY S. H. HAMMOND.

"For myself I prefer the quiet of the country, a ramble along the rivers and brooks, or better still, some wild forest dell, where the birds are merry all the day, and where no unseemly revelry breaks the stillness of night."

NEW YORK:

DERBY & JACKSON, 119 NASSAU STREET.

CINCINNATI:—H. W. DERBY.

1856.

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The next day we started for Bradley's pond, a little lake some five miles deeper in the forest, and midway between the Shazee and the Upper Chataugay. On the bank we built a temporary shantee, and I threw my fly for a few minutes—but it was wasteful to take trout as I caught them there, and I desisted. We coasted this little sea before evening. It is perhaps two miles in circumference, but has little that is attractive about it, save that it lays there all alone in the forest, and great trees hem it in on all sides. Its shores are low and marshy, and I cannot recommend it for its beauty. In the evening we prepared a torch, and struck out on the water in pursuit of deer. It is marvellous, the number there were, along the shores of this little lake. It affords, however, abundant pasture for them. Pond-lilies and grasses grow in the shallow water in great profusion. The pond-lily, in

these lakes, differs from any I have ever seen elsewhere. It grows up from the bottom, sometimes from a depth of fifteen feet, with a great rough stem like a cabbage-stalk, of the same pithy and fibrous texture, as large as a man's arm, until it reaches the surface,

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and there shoots out a hundred tendrils all round, at the end of each one having a great round leaf. From each of these great stems, the leaves thus arranged, and connected with it by the small tendrils, spread over a surface of four or six feet in diameter. It is upon these large stems that the deer feed. They manage to loosen them in some way from the bottom, and feed upon them as they float upon the surface.

We could hear them stamping in the water, and the grating sound of their teeth, as they bit into the stems of the pond-lilies. Every few rods, double lights would glisten before us, and strange to say, the stupid beasts would stand until the canoe approached within six feet of them, gazing in apparent amazement at the strange light that was advancing upon them, but when we looked out from the shadow and showed them our faces, Lord! how they would snort and run. We had no occasion for venison, and we did them no harm that night. In the morning we packed up again, and dove deeper into the forest.

THE BARK CANOE.

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On this lake we found no boat; few amateur fishermen have had the courage to visit its seclusion; and the hunter, as he ranges the wilderness, finds no use for a water craft. But my guide was a man of experience, and of vast resource in all that related to wood craft. "We will," said he, "coast this lake as we have done the rest, and that in a vessel of our own construction."

In the neighborhood of the lake are scattered fir trees of large growth, one of which my guide selected for his purpose, and with his axe felled it to the ground. From the bark stripped from the trunk of this tree, we had, long before sundown, constructed a canoe which, by the exercise of great caution, and by

keeping "our chew of tobacco precisely in the middle of the mouth," enabled us to navigate the lake. It was a curiosity in its way,—small saplings or "staddles," as my guide termed them, cut first some six feet in length, then being nearly severed in the middle, were bent together like clamps, confined and

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held in contact the ends of the bark; these formed the bow and stern; tow, which had found a place in the pack of my guide, was stuffed into the crevices; over this was poured melted gum, gathered from around the knots of the tree we had felled, and from cracks in the unsound trunks of others around us; sticks stretched across from side to side gave it shape, and slim "staddles" laid lengthwise in the bottom, gave it strength to sustain our weight. Paddles were hewn from slabs, split from the trunk of the tree we had felled. Being all prepared, we launched our homely vessel, and seating ourselves in the bottom on a cushion of boughs, we shoved from the shore.

"She walked the water like a thing of life."

So long as we remained seated on the bottom, it was steady enough, but when, from our cramped position, it became necessary to change our posture, it required the skill of a rope dancer to preserve our equilibrium, and prevent one's self from being plumped into the cold waters of the lake.

SHOOTING PARTRIDGES. 51

our dinner. Upon gathering them up, and turning towards the spot where I had left my guide, I saw him with my rifle in his hand, walking around, and looking into the branches of a half-grown hemlock, whistling all the time most furiously. Presently I saw him taking aim at some object in the tree. He fired, and down tumbled a partridge. He fell to loading again, all the time whistling most vociferously. Again he fired, and again a partridge fell from among the branches.

"Halloa! old fellow," said I, "that will do. Fish and fowl will answer for a dinner for hungry men,—

so leave the rest, if there's more of them there." A fire was soon struck, and in half an hour we sat down to a dinner which, with our appetites, an epicure might well envy.

"Look here, Tucker," said I, while stowing away a leg of partridge, "tell me why you kept up such a confounded whistling, while you were looking for those birds in the tree."

"It was to keep them from flyin' away," he replied. "Off here in the woods, they ain't so shy as they are down in the settlements; and when they take to a tree, so long as you keep up a sharp whis-

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tin', a partridge will sit still within fifteen feet of you. You may shoot half a dozen from the same tree, provided there's so many there, and you keep on whistlin'."

"That's something new," said I, "and all I've got to say about it is, that if they're charmed by such music, they have a delicate ear and a singular taste."

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SIGNS OF RAIN.

"You, now, though you may be a smart lawyer at home, don't know that we shall want a shelter afore mornin', and won't leave it until noon to-morrow, unless we agree to be out in the rain—but I know it, and if you want to know how I know it, I'll tell you.

Just listen to the tree-frog, how merrily he pipes all along the shore, up among the branches of the scrubby trees that grow out of the rocks; well, he says, 'it'll rain.' Listen again to the loon—hear, with what a loud, clear voice he speaks, and how it quavers and sinks away into silence; you havn't heard that voice since we left Indian Lake. That loon says, 'it will rain.' Hark again, and you'll hear not a rustling among the leaves and branches of the trees, but a kind of deep far-off moaning; not the creaking of one tall tree

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against another—a sound that don't seem exactly to be a sound either—a sound that we seem to hear but can't describe; you can't tell what way it comes from, whether from the right hand or left, that seems to be far off, and yet you can't say it isn't close by; yet it's

in the forest, all around you. Well, that mysterious voice says, 'it will rain.' Look at that brood of young ducks, scampering about, dipping their heads under the water, and lettin' it run down their backs—see the old one, how often she sits up on cend, and flaps her wings, as if about flyin' away—those ducks are sayin', plain as day, 'it will rain.' Look at that baswood tree on the point before you—see how fan-like it lifts its leaves, turnin' their under side to the sun, makin' the tree-top shine all over like silver; that tree is tellin' us 'it will rain.' Even Shack, there, in the bow of the canoe, by his uneasy motions, curling himself up in a heap at the bottom, and then as soon as he's fairly settled, gettin' onto his feet again, and nosin' out over the water, he says 'it'll rain.'

Presently he straightened himself up, on tip-toes, beat his wings not against the log on which he stood, but against his sides, slow at first, and then faster and faster until the "drumming" was for a few seconds a continuous sound. I saw him thus drum some eight or ten times during the half hour that I was watching him. He did not discover me and I did not disturb him. I was anxious to learn, if I could, his object in thus beating a tattoo on his own ribs, and thought I discovered it when I saw a hen partridge hop on the other end of the log, and walking leisurely up to the drummer, seat herself quietly by his side. They sat together a few minutes, and then left the log and sauntered away among the bushes.

Fauna Americana:

BEING

A DESCRIPTION

OF THE

MAMMIFEROUS ANIMALS

INHABITING NORTH AMERICA.

BY RICHARD HARLAN, M. D.

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MEMBER OF THE AMERICAN PHILOSOPHICAL SOCIETY; OF THE
ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA;
CORRESPONDING MEMBER OF THE LYCEUM OF
NATURAL HISTORY OF NEW YORK,
&c. &c.

"The manner of living nature is so ample, that all may be allowed to sport on it freely; the most jealous proprietor cannot entertain any apprehension that the game will be exhausted, or even perceptibly thinned."

PHILADELPHIA:

PUBLISHED BY ANTHONY FINLEY.

J. HARDING, PRINTER.

1825

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Genus....1. HOMO.

CHARACTERS.

Dental formula.—Teeth 32.	{	superior.16.	{ Incisor 4.
			Canine 2.
		Molar 10.	
	{	inferior 16.	{ Incisor 4.
			Canine 2.
		Molar 10.	

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Species....1. HOMO SAPIENS.

Characters of the species, are those peculiar to the genus.

Inhabit all parts of the earth, omnivorous, disputing for territory; uniting together for the express purpose of destroying their own species.

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1. *Canis familiaris*, Linn. Erxleb. Bodd. Desm.
p. 130. Encycl. pl. 98, fig. 3. pl. 99, 100—1, 2, 3, 4.
Le Chien, Buff. hist. Nat. tom. 5.
The Dog, Penn. Brit. Zool. p. 23.

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The same observations will apply with nearly equal force to the domestic dog of the East Indies; with this difference, viz. in the latter there exists a strong resemblance to the *Jackall*, to which also it is further allied in its howl, and other less observable particulars; indeed a successful union of the dog and jackall has repeatedly taken place.

In corroboration of the above, we may add that

prolific hybrids have been produced by the union of animals generically distinct, between the martin, (*Mustela martes*) and the domestic cat. An account of which is published in one of the early numbers of the New Edinburgh Philosophical Journal.*

* Mr. Sabine states, that during Parry's expedition to the North Pole, the dogs pertaining to the ship, were observed to copulate with the savage wolf; which circumstance he conceives as a convincing proof of identity of species; but the same argument would apply almost equally to prove the identity of the dog and hog.

William Henry Harvey,
Nereis Boreali-Americana: or, Contributions to a History
of the Marine Algae of North America
 (3 vols.) [Washington, D. C., 1851-1858]
 Volume One: [Washington, 1851]

SMITHSONIAN CONTRIBUTIONS TO KNOWLEDGE.

NEREIS

BOREALI-AMERICANA:

OR,

CONTRIBUTIONS TO A HISTORY OF THE MARINE ALGÆ
 OF NORTH AMERICA.

BY

WILLIAM HENRY HARVEY, M.D., M.R.I.A.,

KEEPER OF THE HERBARIUM OF THE UNIVERSITY OF DUBLIN, AND PROFESSOR OF BOTANY TO THE R. D. S.

PART I.—MELANOSPERMEÆ.

WASHINGTON CITY:

PUBLISHED BY THE SMITHSONIAN INSTITUTION.

JANUARY, 1862.

NEW YORK: G. P. PUTNAM.

air are the only essentials to the development of Algæ. It has even been supposed that the minute *Diatomaceæ* whose bodies float through the higher regions of the atmosphere, and fall as an impalpable dust on the rigging of ships far out at sea, have been actually developed in the air ; fed on the moisture semicondensed in clouds ; and carried about with these "lonely" wanderers.

When this atmospheric dust was first noticed, naturalists conjectured that the fragments of minute Algæ of which the microscope showed it to be composed, had been carried up by ascending currents of air either from the surface of pools, or from the dried bottoms of what had been shallow lakes. But a different origin has recently been attributed to this precipitate of the atmosphere by Dr. F. Cohn, Professor Ehrenberg, and others, who now regard it as evidence of the existence of organic life in the air itself ! This opinion is founded on the alleged fact, that atmospheric dust, collected in all latitudes, from the equator to the circumpolar regions, consists of remains of the same species, and that certain characteristic forms are always found in it, and are rarely seen in any other place. Hence it is inferred that the dust has a common origin, and its universal diffusion round the earth points to the air itself as the proper abode of this singular fauna and flora,—for minute animals would seem to accompany and doubtless to feed upon the vegetable atoms. If this be correct, and not an erroneous inference from a misunderstood phenomenon, it is one of the most extraordinary facts connected with the distribution and maintenance of organic life.

If Algæ thus people the finely divided vapour that floats above our heads, we shall be prepared to find them in all water condensed on the earth. The species found on damp ground are numerous. These are usually of the families *Palmellaceæ* and *Nostochaceæ*. To the latter belong the masses of semi-transparent green jelly so often seen among fallen leaves on damp garden walks, after continued rains in autumn and early winter. These jellies are popularly believed to fall from the atmosphere, and by our forefathers were called *fallen stars*.

In certain moist states of the atmosphere, accompanied by a warm temperature, the Nostoc grows very rapidly ; but what seems a *sudden* production of the plant has possibly been long in preparation unobserved. When the air is dry the growth is intermitted, and the plant shrivels up to a thin skin, but on the return of moisture this skin expands, becomes gelatinous, and continues its active life. And as this process is repeated from time to time, it may be that the large jelly which is found after a few days rain is of no very recent growth. A friend of mine who happened to land in a warm dry day on the coast of Australia, and immediately ascended a hill for the purpose of obtaining a view of the country, was overtaken by heavy rains ; and was much surprised to find that the whole face of the hill quickly became covered with a gelatinous Alga, of which no traces had been seen on his ascent. In descending the hill in the afternoon, on his return to the ship, he was obliged to slide down through the slimy coating of jelly, where it was impossible to proceed in any other way. No doubt, in this case, a species of *Nostoc*

which had been unnoticed when shrivelled up had merely expanded with the morning's rain.

Where water lies long on the surface of the ground, as happens in cases of floods, it quickly becomes filled with *Confervæ* or *Silk-weeds*, which rise to the surface in vast green strata. These simple plants grow with great rapidity, using up the materials of the decaying vegetation which is rotting under the inundation, and thus they in great measure counteract the ill effects to the atmosphere of such decay. When the water evaporates, their filaments, which consist of delicate membranous cells, shrivel up and become dry, and the stratum of threads, now no longer green, but bleached into a dull white, forms a coarsely interwoven film of varying thickness, spread like great sheets of paper over the decaying herbage. This *natural paper*, which has also been described under the name of *water flannel*, sometimes covers immense tracts, limited only by the extent of the flood in whose waters it originated.

But though Algæ abound in all reservoirs of fresh water, the waters of the sea are their peculiar home; whence the common name "Seaweeds," by which the whole class is frequently designated. Very few other plants vegetate in the sea, seawater being fatal to the life of most seeds; yet some notable exceptions to this law (in the case of the cocoa nut, mangrove, and a few other plants) serve a useful purpose in the economy of nature.

The sea in all explored latitudes has a vegetation of Algæ. Towards the poles, this is restricted to microscopic kinds, but almost as soon as the coast rock ceases to be coated with ice, it begins to be clothed with *Fuci*: and this without reference to the mineral constituents of the rock, the *Fucus* requiring merely a resting place. Seaweeds rarely grow on sand, unless when it is very compact and firm.

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Probably one half of the species of Algæ of the east coast of North America are identical with those of Europe—a very large portion when we contrast it with the strongly marked difference between the marine animals of the two shores; the testacea, and to a great extent even the fishes of the two continents, being dissimilar. The European species, on the same length of coast, are greatly the more numerous, which appears to be owing to the prevalence of sands, nearly destitute of Algæ, along so great a length of the American shore, and particularly along that portion which, from its latitude, ought to produce the greatest variety of Algæ, were the local circumstances favourable to their growth.

As Algæ are little indebted for nourishment to the soil on which they grow, merely requiring a secure resting place and a sheltered situation, their number generally bears a proportion to the amount of indented rocks that border the coast. Stratified rocks are more favourable to their growth than loose boulders or stones; but if the upper surface be smooth without cavities, it is either swept by the waves too rapidly to allow the growth of a vigorous vegetation; or, in quiet places, it becomes uniformly clothed with some of the *Fuci*, or other *social* species, which cover the exposed surface with a large number of individuals, to the destruction of more delicate species. The rocks, then, most adapted for Algæ are those

in which, here and there, occur deep cavities affording shelter from the too boisterous waves. In these, on the recess of the tide, a *tide pool* or rock basin preserves the delicate fronds from the action of the sun. The rare occurrence of such situations on the American coast is doubtless a reason of the comparative poverty of the marine flora.

This comparative poverty is observable even in the common littoral Fuci or Rock Kelp.

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The part committed to the Algæ in the household of nature, though humble when we regard them as the lowest organic members in that great family, is not only highly important to the general welfare of the organic world, but, indeed, indispensable. This we shall at once admit, when we reflect on the vast preponderance of the ocean over the land on the surface of the earth, and bear in mind that almost the whole submarine vegetation consists of Algæ. The number of species of marine plants which are not Algæ proper is extremely small. These on the American coast are limited to less than half a dozen, only one of which, the common *Eel Grass* (*Zostera marina*), is extensively dispersed.

All other marine plants are referable to Algæ; the wide spread sea would therefore be nearly destitute of vegetable life were it not for their existence. Almost every shore—where shifting sands do not forbid their growth—is now clothed with a varied band of Algæ of the larger kinds; and microscopic species of these vegetables (*Diatomaceæ*) teem in countless myriads at depths of the ocean as great as the plummet has yet sounded, and where no other vegetable life exists. It is not, therefore, speaking too broadly to say that the sea, in every climate and at all known depths, is tenanted by these vegetables under one phase or other.

The sea, too, teems with animal life,—that “great and wide sea, wherein are things creeping innumerable, both small and great beasts,” affords scope to hordes of animals, from the “Leviathan” whale to the microscopic polype, transparent as the water in which he swims, and only seen by the light of the phosphoric gleam which he emits. Now this exuberant animal creation could not be maintained without a vegetable substructure. It is one of the laws of nature that animals shall feed on organized matter, and vegetables on unorganised. For the support of animal life, therefore, we require vegetables to change the mineral constituents of the surrounding media into suitable nutriment.

In the sea this office of vegetation is almost exclusively committed to the Algæ, and we may judge of the completeness with which they execute their mission by the fecundity of the animal world which depends upon them. Not that I would assert that all, or nearly all, the marine animals are directly dependant on the Algæ for their food; for the reverse is notoriously the case. But in every class we find species which derive the whole or a part of their nourishment from the Algæ, and there are myriads of the lower in organization which do depend upon them altogether.

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As being the first vegetables that prey upon dead matter, and as affording directly or indirectly a pasture to all water animals, the Algæ are entitled to notice. Yet this is but one-half of the task committed to them. Equally important is the

influence which their growth exerts on the water and on the air. The well-known fact that plants, whilst they fix carbon in an organized form in extending their bodies by the growth of cells, exhale oxygen gas in a free state, is true of the Algæ as of other vegetables. By this action they tend to keep pure the water in which they vegetate, and yield also a considerable portion of oxygen gas to the atmosphere. I have already stated that whenever land becomes flooded, or wherever an extensive surface of shallow water—whether fresh or salt—is exposed to the air, *Confervæ* and allied Algæ quickly multiply. Every pool, every stagnant ditch is soon filled with their green silken threads. These threads cannot grow without emitting oxygen. If you examine such a pool on a sunny day, you may trace the beads of oxygen on the submerged threads, or see the gas collect in bubbles where the threads present a dense mass. It is continually passing off into the air while the *Confervæ* vegetate, and this vegetation usually continues vigorous, one species succeeding another as it dies out, as long as the pool remains.

Several Algæ are used in the arts in a minor way. Thus, according to Dr. Patrick Neill, knife-handles are made in Scotland of the stems of *Laminaria digitata*. "A pretty thick stem is selected, and cut into pieces about four inches long. Into these, when fresh, are stuck blades of knives, such as gardeners use for pruning or grafting. As the stem dries, it contracts and hardens, closely and firmly embracing the hilt of the blade. In the course of some months the handles become quite firm, and very hard and shrivelled, so that when tipped with metal they are hardly to be distinguished from hartshorn."

On the authority of Lightfoot,† the stems of *Chorda filum*, which often attain the length of thirty or forty feet, and which are popularly known in Scotland as "Lucky Minny's lines," "skinned, when half dry, and twisted, acquire so considerable a degree of strength and toughness," that the Highlanders sometimes use them as fishing lines. The slender stems of *Nereocystis* are similarly used by the fishermen in Russian America.

Here the Sea Otter (*Lutra marina*) has his favourite lair, resting himself on the vesicle, or hiding among the leaves while he pursues his fishing. The stem which anchors this floating mass of fronds, though no thicker than whip-cord, must be of considerable strength and flexibility; and accordingly we find it employed as a fishing line by the rude natives of the coast. But great as is the length of this seaweed, it is exceeded by the *Macrocystis*, whose stems are calculated by Dr. Hooker* occasionally to reach 700 feet, while Bory St. Vincent attributes to them a length of 1500 feet. These are the longest fronded of the Order, and indeed the longest vegetables that are known. Others, as the *Lessonia* of the Pacific and Southern Oceans, though of less height have stems of much greater bole, and a habit that reminds us of some large endogenous arborescent plants, as the *Aloe dichotoma* or as the *Dracæna Draco*. These gigantic Algæ have trunks of considerable diameter and height, branched dichotomously, each branch bearing at its summit bunches of long ribbon-like leaves. Torn from the submerged rocks on which they grow, these marine trees are driven ashore on the rocky coasts of the

Falkland Islands in great numbers, and lie, as Dr. Hooker well describes, rotting for many a mile, in banks several yards in breadth and three or four feet in depth. The trunks, from which the leaves have been washed, resemble drift-wood, and "on one occasion" (as related by Dr. Hooker) "no persuasion could prevent the captain of a brig from employing his boat's crew, during two bitterly cold days, in collecting this incombustible weed for fuel." Another noble genus of the Southern Ocean (*Ecklonia*) may be compared to the Palm in habit, having pinnated fronds of large size. One of the best known species, the *Trumpet-weed* (*Ecklonia buccinalis*) of the Cape of Good Hope, has a stem often more than twenty feet in height, crowned with a fan-shaped cluster of leaves, each twelve feet long or more. The stem of this seaweed which is hollow in the upper portion is, when dried, often used in the colony as a siphon; and by the native herdsmen is formed into a trumpet for collecting the cattle at evening.

VI. LAMINARIA, *Lamour.*

Frond stipitate, coriaceous or membranaceous, flat, ribless, undivided or irregularly cleft. *Fructification*, cloud-like patches of *spores*, imbedded in the thickened surface of some part of the leafy expansion.

The plants commonly known as *Oarweed*, *Tangle*, *Devil's Apron*, *Riband-weed*, *Sole-leather-kelp*, &c. belong to this genus, which is more numerous in species, and possessed of a wider geographical range than any other of the Order. With the exception of *L. Fascia*, which is only a few inches long, they are all plants of a large size, varying from three to twelve, or twenty feet in length. They commence to grow about low-water mark, and descend, beyond that limit, to the depth of five to ten fathoms.

5. *Laminaria longicuris*, De la Pyl.; Stipes very long, slender at the base, hollow and inflated in the middle, and gradually tapering to the apex; frond undivided, ovato-lanceolate, membranaceous, obtuse. *J. Ag. Sp. Alg. vol. 1, p. 135. Kütz. Sp. Alg. p. 576. Harv. Phyc. Brit. t. 339. (TAB. VI.)*

HAB. In deep water, from five to ten fathoms (or more?). Very abundant on the American shores, from Greenland to Cape Cod. Newfoundland, *De la Pylaie*. Bahama Islands, *Chauvin*. (v. v.)

It is by far the most abundant species on the northern coasts, and gradually diminishes, in the number of individuals, and in the size and luxuriance of growth, as it extends southward. In Boston Bay it is still plentiful, though of much smaller dimensions than at Halifax, where it is the chief ornament of the sub-marine flora. I have seen no specimen from a more southern locality than Cape Cod; but M. Chauvin is said to have received it from the Bahamas. In Europe it is scarcely known to grow beyond the limits of the Arctic Sea, whence water-worn specimens occasionally reach the coasts of Scotland, and of the north of Ireland.

THE EMIGRANT.

BY

SIR FRANCIS B. HEAD, BART.

"SEND HER VICTORIOUS, HAPPY AND GLORIOUS,
LONG TO REIGN OVER US, GOD SAVE THE QUEEN!"
Old Song.

SECOND EDITION.

LONDON:
JOHN MURRAY, ALBEMARLE STREET.
1846.

CHAPTER I.

A NEW SKY.

HOWEVER deeply prejudiced an Englishman may be in favour of his own country, yet I think it is impossible for him to cross the Atlantic without admitting that in both the northern and southern hemispheres of the new world Nature has not only outlined her works on a larger scale, but has painted the whole picture with brighter and more costly colours than she used in delineating and in beautifying the old world.

The heavens of America appear infinitely higher—the sky is bluer—the clouds are whiter—the air is fresher—the cold is intenser—the moon looks larger—the stars are brighter—the thunder is louder—the lightning is vivid—the wind is stronger—the rain is heavier—the

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mountains are higher—the rivers larger—the forests bigger—the plains broader; in short,

the gigantic and beautiful features of the new world seem to correspond very wonderfully with the increased locomotive powers and other brilliant discoveries which, under the blessing of an Almighty power, have lately been developed to mankind.

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Now, it is curious to reflect that while every backwoodsman in America is occupying himself, as he thinks, solely for his own interest, in clearing his location, every tree—which, falling under his axe, admits a patch of sunshine to the earth—in an infinitesimal degree softens and ameliorates the climate of the vast continent around him; and yet, as the portion of cleared land in North America, compared with that which remains uncleared, has been said scarcely to exceed that which the seams of a coat bear to the whole garment, it is evident, that although the assiduity of the Anglo-Saxon race has no doubt affected the climate of North America, the axe is too weak an instrument to produce any important change.

But one of the most wonderful characteristics of Nature is the manner in which she often, unobservedly, produces great effects from causes so minute as to be almost invisible, and accordingly while the human race—so far as an alteration of climate is concerned—are

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labouring almost in vain in the regions in question, swarms of little flies, strange as it may sound, are, and for many years have been, most materially altering the climate of the great continent of North America!

The manner in which they unconsciously perform this important duty is as follows:—

They sting, bite, and torment the wild animals to such a degree, that, especially in summer, the poor creatures, like those in Abyssinia, described by Bruce, become almost in a state of distraction, and to get rid of their assailants, wherever the forest happened to be on fire, they rushed to the smoke, instinctively knowing quite well that the flies would be unable to follow them *there*.

The wily Indian observing these movements, shrewdly perceived that by setting fire to the forest the flies would drive to him his game, instead of his being obliged to trail in search

passing.

"Here's a bird for you, Harry," said Nash to Patterson, as standing up in the skiff he took the frightened captive out of his hat, "and if it sings as well in a cage as it did just now in the air, it will be the best you have ever heard."

Patterson, descending a few steps from the gangway, stretched out his hand and received the bird, which he immediately called "*Charley*" in remembrance of his faithful friend Nash.

In the Gulf of St. Lawrence the vessel was wrecked, almost every thing was lost except the lives of the crew and passengers, and accordingly when Patterson, with his wife hanging heavily on his arm, landed in Canada, he was destitute of every thing he had owned on board excepting *Charley*, whom he had preserved and afterwards kept for three days in the foot of an old stocking.

After some few sorrows, and after some

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little time, Patterson settled himself at Toronto, in the lower part of a small house in King Street, the principal thoroughfare of the town, where he worked as a shoemaker. His shop had a southern aspect; he drove a nail into the outside of his window, and regularly every morning, just before he sat upon his stool to commence his daily work, he carefully hung upon this nail a common skylark's cage, which had a solid back of dark wood, with a bow or small wire orchestra in front, upon the bottom of which there was to be seen, whenever it could be procured, a fresh sod of green turf.

As *Charley's* wings were of no use to him in this prison, the only wholesome exercise he could take was by hopping on and off his little stage; and this sometimes he would continue to do most cheerfully for hours, stopping only occasionally to dip his bill into a small square tin box of water suspended on one side, and then to raise it for a second or two towards the sky. As soon, however, as (and only when his spirit moved him) this feathered captive again hopped upon his stage, and there, standing on a bit of British soil, with his little neck extended, his small head slightly

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turned, his drooping wings gently fluttering, his bright black eyes intently fixed upon the distant deep, dark-blue Canada sky, he commenced his unpremeditated morning song, his extempore matin prayer!

The effect of his thrilling notes, of his shrill, joyous song, of his pure, unadulterated English voice upon the people of Canada cannot be described, and probably can only be imagined by those who either by adversity have been prematurely weaned from their mother country, or who, from long-continued absence from it, and from hope deferred, have learned in a foreign land to appreciate the inestimable blessings of their father-land, of their parent home. All sorts of men, riding, driving, walking, propelled by urgent business, or sauntering for appetite or amusement, as if by word of command, stopped spell-bound to listen, for more or less time, to the inspired warbling, to the joyful hallelujahs of a common homely-dressed English lark! The loyal listened to him with the veneration with which they would have listened to the voice of their Sovereign; reformers, as they leaned towards him, heard nothing in his enchanting melody

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which even *they* could desire to improve. I believe that in the hearts of the most obdurate radicals he reanimated feelings of youthful attachment to their mother country; and that even the trading Yankee, in whose country birds of the most gorgeous plumage snuffle rather than sing, must have acknowledged that the heaven-born talent of this little bird unaccountably warmed the Anglo-Saxon blood that flowed in his veins. Nevertheless, whatever others may have felt, I must own that, although I always refrained from joining *Charley's* motley audience, yet, while he was singing, I never rode by him without acknowledging, as he stood with his outstretched neck looking to heaven, that he was (at all events, for his size) the most powerful advocate of Church and State in Her Majesty's dominions; and that his eloquence was as strongly appreciated by others, Patterson received many convincing proofs.

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three times was he interrupted in his

work by people who each separately offered him one hundred dollars for his lark: an old farmer repeatedly offered him a hundred acres of land for him; and a poor Sussex carter who had imprudently stopped to hear him sing, was so completely overwhelmed with affection and *maladie du pays*, that, walking into the shop, he offered for him all he possessed in the world . . . his horse and cart; but Patterson would sell him to no one.

On the evening of the —th of October, 1837, the shutters of Patterson's shop-windows were half closed, on account of his having that morning been accidentally shot dead on the island opposite the city. The widow's prospects were thus suddenly ruined, her hopes blasted, her goods sold, and I need hardly say that I made myself the owner—the lord and the master of poor Patterson's lark.

It was my earnest desire, if possible, to better his condition, and I certainly felt very proud to possess him; but somehow or other this "Charley-is-my-darling" sort of feeling ~~evidently~~ was not reciprocal. Whether it was that in the conservatory of Government House

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at Toronto Charley missed the sky—whether it was that he disliked the movement, or rather *want* of movement, in my elbows—or whether from some mysterious feelings, some strange fancy or misgiving, the chamber of his little mind was hung with black, I can only say that during the three months he remained in my service I could never induce him to open his mouth, and that up to the last hour of my departure he would never sing to me.

On leaving Canada I gave him to Daniel Orris, an honest, faithful, loyal friend, who had accompanied me to the province. His station in life was about equal to that of poor Patterson; and accordingly, so soon as the bird was hung by him on the outside of his humble dwelling, he began to sing again as exquisitely as ever. He continued to do so all through Sir George Arthur's administration. He sang all the time Lord Durham was at work—he sang after the Legislative Council—the Executive Council—the House of Assembly of the province had ceased for ever to exist—he sang

all the while the Imperial Parliament were framing and agreeing to an Act by which even

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the name of *Upper* Canada was to cease to exist—he sang all the while Lords John Russell and Sydenham were arranging, effecting, and perpetuating upon the United Provinces of Canada the baneful domination of what they called "responsible government;" and then, feeling that the voice of an English lark could no longer be of any service to that noble portion of Her Majesty's dominions—he died!

Orris sent me his skin, his skull, and his legs. I took them to the very best artist in London—the gentleman who stuffs for the British Museum—who told me to my great joy that these remains were perfectly uninjured. After listening with great professional interest to the case, he promised me that he would exert his utmost talent; and in about a month Charley returned to me with unruffled plumage, standing again on the little orchestra of his cage, with his mouth open, looking upwards—in short, in the attitude of singing, just as I have described him.

I have had the whole covered with a large glass case, and upon the dark wooden back of the cage there is pasted a piece of white

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paper, upon which I have written the following words:—

THIS LARK,
TAKEN TO CANADA BY A POOR EMIGRANT,
WAS SHIPWRECKED IN THE ST. LAWRENCE,
AND AFTER SINGING AT TORONTO FOR NINE YEARS,
DIED THERE ON THE 14TH OF MARCH, 1843,
UNIVERSALLY REGRETED.

Home! Home! Sweet Home!

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THE LONG TROT.

CHAP. VI.

I resolved to inspect every district in the province, and accordingly, during the two summers I was in Canada, I employed myself in this duty.

The plan I pursued was, to give notice of the time and place at which I proposed to enter each district; and accordingly, on my arrival, I generally found assembled, on horseback, people of all conditions, who, generally from

good feelings, and occasionally from curiosity, had determined to accompany me through their respective townships.

The pace I travelled at, from morning till five or six o'clock in the evening, was a quiet, steady, unrelenting trot; and in this way I proceeded many hundred miles, listening sometimes to one description of politics and sometimes to another—sometimes to an anecdote and sometimes to a complaint—sometimes to a compliment and sometimes, though very rarely, to observations evidently proceeding from a moral region “on the north side of friendly.”

I thus visited all the cities, towns, and

largest villages: all the principal locations—

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The flooding of the wilderness was a sentence of death to every tree whose roots remained covered with water; and yet no sooner was this operation effected than Nature appeared determined to repair the injury by converting the fluid which had created the devastation into a verdant prairie; and accordingly from the hidden soil beneath there arose to the surface of these artificial lakes a thin green scum, which gradually thickened, until the whole surface assumed the appearance I have described.



Rev. D. D. Leisenger

FROM A PORTRAIT PAINTED AT THE AGE OF FORTY.

A NARRATIVE

OF THE

MISSION OF THE UNITED BRETHREN

AMONG THE

DELAWARE AND MOHEGAN INDIANS,

FROM ITS COMMENCEMENT, IN THE YEAR 1740, TO THE
CLOSE OF THE YEAR 1808.

COMPRISING

ALL THE REMARKABLE INCIDENTS WHICH TOOK
PLACE AT THEIR MISSIONARY STATIONS
DURING THAT PERIOD.

INTERSPERSED WITH

ANECDOTES, HISTORICAL FACTS, SPEECHES OF IN-
DIANS, AND OTHER INTERESTING MATTER.

BY JOHN HECKEWELDER,

Who was many years in the service of that Mission.

PHILADELPHIA:

PUBLISHED BY MCARTY & DAVIS.

1820.

of corn, which, when scarcely out of the milch, was exposed to the hard frosts which set in, by which it was frozen, and when afterwards a thaw came on, it rotted and had to be thrown away. This was a great disappointment, and we were apprehensive, that we would be put to great suffering, for a season. Otherwise, the congregation was internally in a happy course: all usual regulations, both as to the daily meetings—family exhortations, and visiting the sick, had, from the beginning taken place; and to see the happy exit of several, who departed this life during this year, was truly edifying.

With the new year of 1784, the weather became uncommonly boisterous, and the cold so very intense, that rivers, creeks, and the lake St. Clair, were soon covered with ice, which from day to day became thicker* and stronger. Next fell a snow of two feet deep, and in a few days after, another of much greater depth, so that both together, measured full five feet on a level. How gloomy was the prospect before us! Our Indians soon began to suffer, and we, in a great measure, with them. Grain was not only scarce with us, but had become a scarce article throughout the settlement of the white people, (or French Canadians), and the winter being through the whole country the same, those who had grain, would not part with any, but keep it to save themselves and their

* On measuring, the ice was found to be three feet two inches thick on the lake, at the distance of a mile from the shore.

cattle from starving.—Many emaciated countenances, were a sad token of the distress, of the poorer people. The nearest settlements, were at the distance of twenty miles from us. We had no stables as yet, for our cattle, and what little fodder we had, was but indifferent, the frost, having been so hard before it was cut and cured. When we cut trees down for fire wood, the trunks were buried in the snow, which made it a most laborious business, to procure this article.

While relief, both for man and beast, seemed to be out of our reach; we were taught by the instinct of our beasts, that much was to be found, almost at our doors. That a wise and benign providence, had provided the means of subsistence, for all living creatures, even in the cold and dreary regions of Canada, appeared evident.

Buried, as we almost were in the snow, with the cattle standing close to our doors; they would raise their heads towards the river, which lay but a short distance from the village, as if they wished to go there, and the Indians supposing this was occasioned by their want of drink, melted snow for them, to satisfy their thirst;—seeing however, that they still kept casting eager looks in the same direction, and with their noses raised, as though they smelt something, we were all at a loss to know the cause. While this was the case, two deer, that came down the river on the ice opposite the village, were shot; they being opened to see what they had fed upon, it was found, that their stomachs were full.

ed with the *scrub grass*,* (*Equisetum hyemale*.) The Indians, attentive to the discovery, all joined in working a way for the cattle to get to the river, or on the ice; as soon as this was effected, the cattle were seen, ranging along the banks, where they found the green scrub grass pasture in abundance, not only along the river banks,† but along the frozen ponds, adjoining the same, where "brecks," or fields of hundreds of acres of this grass was presented to them. The suffering Indians being by this, taught where the deer where to be looked for, could now daily get as much meat as they wanted, as by making themselves *rackets*, they could walk over the snow without sinking; whilst the deer could not escape them, either in the snow, or on the ice. It was indeed astonishing, to see the meat that was daily brought in, and we found, that during the three months that the snow lay so deep, upwards of one hundred deer were taken from the rush meadows and the river; some of them being run down, or caught by the dogs, were brought alive to the village, and there fed with the scrub grass, gathered for the purpose, and finally, in the spring, taken alive to Detroit, and sold.

Strange as it may appear, yet it is a fact; that even

*Scrub, and scour grass, so called, as it is made use of in scouring pewter, &c.

† The high winds, in Canada, which always succeed a fall of snow, blow all the snow off of the ice, whether it be frozen lakes, rivers, ponds, &c. so that the deer and cattle can get at this food.

our hogs lived chiefly upon those rushes, or the sap or juice thereof, for after chewing the stalks, until they had drawn the juicy substance out, they would drop the cud, and take a fresh bite.

Both these and the horned cattle, were not only saved from starving during the winter, but were in fine order in the spring. Even the fowls would eat it greedily, after being cut up in small pieces of the size of a grain of Indian corn; and the Indians say, that they lay more eggs when fed with rushes, than when fed with corn; but to the horses, (who are equally fond of it,) it proved fatal. A lean horse would get fat on them in four or five weeks, but if left to feed a few weeks longer, they would surely die. On examining into the cause of this, it was discovered, that their stomachs were cut up, or worn quite thin, and full of small holes, like a sieve; whereas, with horn cattle,* and deer who chewed the cud, the roughness, or sharpness of the grass had not this effect. We lost two thirds of our horses, before the discovery was made.

By daily observation on the weather, from the beginning of January, when the first snow fell, to the beginning of March, there was not (during the whole time,) more than four clear sunshine days, the sky

* In November of the year following this, an Innkeeper of Detroit, sent about thirty head of very lean cattle, which had been brought in from the United States, to the rush meadows, within three miles of our village, and some salt to one of our people, to salt them once a week. These cattle, which had not once attempted to go off, were all, before the winter was over, fit for the knife.

FRANK FORESTER'S FIELD SPORTS

OF THE

UNITED STATES,

AND

BRITISH PROVINCES, OF NORTH AMERICA.

There is exhilaration in the chase—
Not bodily only.

It is a mingled rapture, and we find
The bodily spirit mounting to the mind.

Sir Egerton Brydges.

BY

HENRY WILLIAM HERBERT;

AUTHOR OF "MY SHOOTING BOX," "THE WARWICK WOODLANDS,"
"MARMADUKE WYVIL," "CROMWELL," "THE BROTHERS,"
"THE ROMAN TRAITOR," &C., &C

IN TWO VOLUMES.

VOL. I.

NEW-YORK:
STRINGER & TOWNSEND.

(Late Burgess, Stringer & Co)
223 BROADWAY.

1849.

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THE GAME

OF THE

UNITED STATES AND BRITISH PROVINCES.



AME is not every thing which exists in the shape of birds or beasts in a state of nature, *feræ naturâ*, in the woods, the wastes, or the waters.

This, to sportsmen, self-evident proposition is by no means generally admitted or applied by the gunners of the United States, or the recorders of their feats; as will

be readily seen by those who peruse the registers of game killed, in the great hunting parties which are constantly occurring in the more remote districts of the Eastern and Midland States—registers in which we shall find Owls, Hawks, Bluejays, Robins, Pigeons, Squirrels; nay, even Skunks, Ground-hogs, and Opossums enumerated as game.

Game is an arbitrary term, implying, in its first and most correct sense those animals, whether of fur or feather, which are the natural pursuit of certain high breeds of dogs, and which such dogs, whether they have ever met with the animal before or not, will instinctively follow and take.

Thereafter, it comes to signify all animals which are so pursued by dogs for the purpose of sport, not of obtaining food, or of destroying a noxious animal merely, and to which certain courtesies, if I may so express myself, are shewn, and certain semi-chivalrous usages extended.

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At the same time, with but two exceptions that occur to me, no animal can properly be game which is not fitted for the table, and the flesh of which is not delicate, and esteemed a rarity.

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Of the first, second and third of these genera, there are but three species found on this continent, one of each.

THE BISON, *Bos Americanus*, peculiar to North America.
THE ROCKY MOUNTAIN SHEEP, *Ovis Montana*; and
THE AMERICAN ANTELOPE, or PRONGHORN.

Of the Deer there are five varieties found in the territories of the United States and the Provinces, namely—

THE MOOSE, *Cervus Alces*;
THE ELK, *Cervus Canadensis*;
THE CARIBOO, American Reindeer, *Cervus Tarandus*;
THE COMMON DEER, *Cervus Virginianus*; and
THE BLACK-TAILED DEER, *Cervus Macrotis*.

Of the Hare there are two varieties known on this continent:

THE COMMON HARE—vulg. Rabbit—*Lepus Americanus*; and
THE NORTHERN HARE, *Lepus Virginianus*.

Of the Bear also there are two varieties:

THE COMMON BROWN BEAR, *Ursus Americanus*; and
THE GRISLY BEAR, *Ursus Horribilis*.

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All the game birds, proper, of this continent, then, belong to three orders; one of land, and two of—as they are called—water birds; although several species of the latter are found inland and on uplands.

All our game, coming under the head of land-birds, proper, are of the order termed by ornithologists *Rasores*; and belong to two families, *Pavonidae*, and *Tetraonidae*; or birds following the types of the Peacock, and of the Grouse. Of these again we have three subdivisions—*Meleagris*, or Turkey; *Ortyx*, or American Quail; and *Tetrao*, or Grouse.

Of the second* family *Pavonidae*, and first genus *Meleagris*, the United States possess but one species.

THE WILD TURKEY. *Meleagris Gallipavo*.

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1. THE COMMON AMERICAN QUAIL, *Ortyx Virginiana*;
2. THE CALIFORNIAN QUAIL, *Ortyx Californica*;
3. THE PLUMED QUAIL, *Ortyx Plumifera*;
4. THE WELCOME QUAIL, *Ortyx Neoxena*;
5. THE PAINTED QUAIL, *Ortyx Picta*;
6. THE DOUGLASS QUAIL, *Ortyx Douglasii*.

The ten American species of Grouse are as follows:

1. THE COMMON RUFFED GROUSE, *Tetrao Umbellus*;
2. THE PINNATED GROUSE—or the Heath-Hen, *Tetrao Cupido*;
3. THE CANADA GROUSE—or Spruce Grouse, *Tetrao Canadensis*;
4. THE DUSKY GROUSE, *Tetrao Obscurus*;

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5. THE COCK OF THE PLAINS, *Tetrao Urophasianus*;
6. THE SHARP-TAILED GROUSE, *Tetrao Phasianellus*;
7. THE WILLOW GROUSE, *Tetrao Saliceti*;
8. THE AMERICAN PTARMIGAN, *Tetrao Mutus*;
9. THE ROCK PTARMIGAN, *Tetrao Rupestris*;
10. THE WHITE-TAILED PTARMIGAN, *Tetrao Leucurus*.

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- 1st. THE COMMON AMERICAN COOT, *Fulica Nigra*, which is a common autumnal visitant of all the coasts, bays and salt

marshes from Pennsylvania eastward.

Of the Rail, three species are well known to all our sportsmen.

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- 1st. THE VIRGINIA RAIL, *Rallus Virginianus*;
- 2nd. THE CLAPPER RAIL—Vulg. Meadow, or Mud, Hen—*Rallus Crepitans*;
- 3rd. THE COMMON SORA RAIL, *Rallus Carolinus*, which is the bird killed in such abundance on the flats and reed-beds of the Delaware in autumn.

The fourth family, *Scolopacidae*, contains almost all our best and most delicious species for the table, and those which are most eagerly pursued and most highly prized by the genuine sportsman.

All the genera of this family are game, and scarcely one but contains some favorite species.

The first is *Tringa*, Sandpiper, of which we have eight or nine varieties, classed indiscriminately with the next two genera, as *Bay birds*, by our gunners.

The second, *Totanus*, Tatler, contains seven species, all of which are common along the Atlantic seaboard, and four, at least, of which are universally known and general favorites.—The first I regard, myself, as the best bird that flies, in an epicurean point of view, not excepting even the world-famous canvass back. The varieties are—

1. THE UPLAND PLOVER, Grass Plover, or Frost Bird, *Totanus Bartramius*;
2. SEMI-PALMATED SNIPE, or Willet, *Totanus Semipalmatus*.

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3. SPOTTED TATLER, *Totanus Macularius*;
4. SOLITARY TATLER, *Totanus Solitarius*;
5. YELLOW SHANKS TATLER, Lesser Yellow Leg, *Totanus Flavipes*;
6. TELLTALE TATLER, Greater Yellow Leg, *Totanus Vociferus*; and
7. GREEN SHANKS TATLER, *Totanus Glottis*.

Of these the Upland Plover, the Willet, and the two Yellow Legs are very general favorites. The first is an excellent bird; the others, *me judice*, are, nine times out of ten, uneatably fishy or sedgy.

The third genus, *Limosa*, Godwit, has but one species which visits us.

THE GREAT MARBLED GODWIT, or Straight-billed Curlew, *Limosa Fedoa*, frequently killed with the Sandpipers, Plovers and Tattlers on the Long Island bays, and the shores of New Jersey.

The fourth genus, *Scolopax*, has three species known to every sportsman; two his most chosen game. They are—

1. WILSON'S SNIPE—vulg. English Snipe—*Scolopax Wilsonii*;
2. RED-BREASTED SNIPE—vulg. Quail Snipe—*Scolopax Noberacensis*; and
3. THE AMERICAN WOODCOCK, *Scolopax Minor*.

The other genera, each containing one species, are the *Recurvirostra*, Avosets; *Himantopus*, Stilt; and *Numenius*, Curlew; all of which are well known to our fowlers, though, with the exception of the last, all falsely termed Bay Snipe.

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We now arrive at the last order, *Natatores*, swimmers, of which, to take cognisance, under the head of its second family,

Anatida. The second genus of this family, *Anser*, Goose, gives us four species, though two, the third and fourth, are far from common. The first and third are decidedly the best of our sea fowl.

1. THE CANADA GOOSE—Wild Goose—*Anser Canadensis* ;
2. THE BARNACLE GOOSE,* *Anser Leucopsis* ;
3. THE BRANT GOOSE—Brant—*Anser Bernicla* ;
4. THE WHITE-FRONTED GOOSE, *Anser Albifrons* ; and
5. THE SNOW GOOSE, *Anser Hyperboreus*.

The third genus, *Swan*, affords two species to North America, but the second only belongs to the Eastern States ; the Trumpeter ranging only through Northern California to the fur countries, from westward of the Ohio.

1. THE TRUMPETER SWAN, *Cygnus Buccinator* ; and
2. THE AMERICAN SWAN, *Cygnus Americanus*.

The fourth genus, *Anas*, Duck, contains ten species, every one of which, with the exception of the fourth, is well known to all sportsmen ; they are of the finest quality for the table, and preferable to all others, with the exception of the Canvass Back, and perhaps the Red Head. They are as follows :

1. THE MALLARD—vulg. Green Head—*Anas Boschas* ;
2. THE DUSKY DUCK—vulg. Black Duck—*Anas Obscura* ;
3. THE GADWALL, *Anas Strepera* ;
4. BREWER'S DUCK, *Anas Breweri* ;
5. THE AMERICAN WIDGEON, *Anas Americana* ;
6. THE PINTAIL DUCK, *Anas Acuta* ;
7. THE WOOD DUCK, Summer Duck, *Anas Sponsa* ;
8. AMERICAN GREEN-WINGED TEAL,† *Anas Carolinensis*.

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9. THE BLUE-WINGED TEAL,* *Anas Discors*, and
10. THE SHOVELLER, *Anas Clypeata*.

The fifth genus, *Fuligula*, Sea Duck, contains sixteen species, several of which are well known, and the two first prominent above their race. They are—

1. THE CANVASS BACK DUCK, *Fuligula Valisneria* ;
2. THE RED-HEADED DUCK†—vulg. Red-head—*Fuligula Marila* ;
3. THE SCAUP DUCK, *Fuligula Marila* ;
4. THE RING-NECKED DUCK, Tufted Duck, *Fuligula Rustorques* ;
5. THE RUDDY DUCK, *Fuligula Rubida* ;
6. THE PIED DUCK, *Fuligula Labradora* ;
7. THE VELVET DUCK, *Fuligula Fusca* ;
8. THE SURF DUCK, *Fuligula Perspiculata* ;
9. THE AMERICAN SCOTER, *Fuligula Americana* ;
10. THE EIDER DUCK, *Fuligula Mollissima* ;
11. THE GOLDEN-EYE DUCK, *Fuligula Clangula* ;
12. THE BUFFEL-HEADED DUCK, *Fuligula Albeola* ;
13. THE HARLEQUIN DUCK, *Fuligula Histrionica* ;
14. THE LONG-TAILED DUCK—vulg. South-southerly—*Fuligula Glacialis* ;
15. THE KING DUCK, *Fuligula Spectabilis* ; and
16. THE WESTERN DUCK, *Fuligula Dispar*.

The sixth genus, *Mergus*, Merganser, contains three well known species, which, commonly shot and of rare beauty, are all nearly worthless as articles of food, so rank and fishy is their flesh. They are, as follows :

1. THE GOOSANDER—vulg. Sheldrake—*Mergus Merganser* ;
2. THE RED-BREADED MERGANSER, *Mergus Serrator* ; and
3. THE HOODED MERGANSER, *Mergus Cucullatus*.

UPLAND SHOOTING

OF THE

NORTHERN STATES AND BRITISH PROVINCES.

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Now the shooting of these birds in spring, as they are either pairing here preparatory to breeding, or moving northward preparatory to pairing, or even actually breeding—as is the case when they are shot in May—is precisely what it would be to shoot Woodcock in February, March, and April, or Quail so late as to the middle of May ; the destruction of the breeders, and consequent diminution of the number of the next year's young, being the same in both cases. The American Snipe lays four eggs ; the death, therefore, of every Snipe during spring shooting is equivalent to the death of five of these beautiful and sporting little birds.

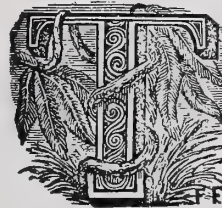
This, one would suppose, would be conclusive against the practice ; but if he venture to break ground in favor of the abolition by law of this unfair, and I must think, unsportsmanlike practice, he is met and silenced by some such exquisite reason as this—that if spring Snipe-shooting were prohibited, we should have no spring shooting at all ; and the same exquisite reason is adduced against the only step which can save the Woodcock from extermination, I mean the abolition of summer cock-shooting.

To return, however, to spring Snipe-shooting, as it is.

So soon as the spring is fairly broken, and the frost—to use a common phrase—entirely out of the ground, the Snipe begins to appear upon our meadows. This breaking of the spring, and disappearance of the subterranean frost is, as is well known, very uncertain as regards the time of its occurrence.

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SUMMER WOODCOCK SHOOTING.



HE wisdom of our game laws has decided that Woodcock shall be killed and taken, by all and sundry, in the State of New-York, on and after the first, in the State of New Jersey on and after the fifth day of July ; although in the latter State the practice of the sovereign people has determined that the fourth is the day intended by the enactment, and on the fourth, accordingly, the slaughter commences. In Pennsylvania, and Connecticut, practice at least, if not law—and until recently, if there be now, there was no statute on the subject—has prescribed the same, or nearly the same period, for the commencement of Cock-shooting ; and even in those counties of New-York to which the enactment of these game laws, such as they are, does not extend, tacit agreement has prescribed the same regulation, at least among sportsmen.

So far, indeed, has this practice been carried, that by means of a convention of this sort, the shooting of Woodcock is tabooed, until the fourth of July, even in the islands of the Great Lakes and the Detroit River. The example was set by the officers, I believe, of the American and British garrisons at Detroit and Amherstberg, acting in concert, and the practice has almost become common law.

The fact is, therefore, that everywhere through the United States and the British Provinces, whether there is or is not any distinct law on the subject, the commencement of July is as

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On the first of July, then, Woodcock shooting legitimately commences; although before that day hundreds, nay thousands, are killed along the sea-board, and notoriously offered for sale by almost all the *restaurateurs* and hotel-keepers in New-York, the utmost efforts of the Sportsman's Club to the contrary notwithstanding.

At this period, about four-fifths of the birds—the young birds, of course, I mean—are half grown or thereabout, some only being a few weeks old, and others, in late and adverse seasons, scarcely hatched.

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UPLAND PLOVER SHOOTING.

WITH the end of July, all that can properly be called shooting, as a genuine sport, is at an end. The Woodcock, as I have already stated, is no longer to be found, whether he be lying *perdu* on the mountain tops, or off on a wilder wing for the far north. The Snipe has not yet begun to return from his arctic breeding places; the Quail is still busy with her eggs, or her fledgling *cheepers*; and the Ruffed Grouse, although her young are already two-thirds grown, is protected by the game-laws until the first day of November.

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In the meantime, however, while there is no legitimate upland shooting to be had—by legitimate, I mean that, which is followed with dogs, whether Setter, Pointer or Spaniel, in a legitimate and scientific manner—there comes into play, at the very critical moment, the “Bartramian Sandpiper,” better known as the “Upland Plover”—“Grass Plover”—“Field Plover,” or “Frost Bird”—which as far as a *bonne bouche* for the epicure goes, is inferior in my judgment to no bird that flies, unless it be the Canvass-Back; and there, with the Chancellor, I doubt!

This bird, which by the way is *not* a Plover, though very nearly allied to that species, is stated by Mr. Audubon to arrive in the Middle States, early in May, to reach Maine by the middle of that month, to breed from Maryland northward to the Sashatchewan, and to winter in Texas and Mexico.

It is shot, in the Eastern and Middle States, from Massachusetts to Pennsylvania, during the months of August and September, and in fact, until it is driven southward by the frosts;

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SPORTING NOMENCLATURE.

It has been suggested to me by a friend, from whom no suggestion is to be disregarded, WILLIAM T. PORTER, Esq., of the Spirit of the Times, that the appropriate sporting nomenclature and terms are so little understood, or so much neglected here, that a brief compilation of the most remarkable in general use, would be an addition to this work, not unacceptable to the sporting world of America; and agreeing with him in the fact, I have readily fallen into his views.

I shall proceed, therefore, to give first, the technical name for a single hatching of young from every game bird—that I mean which we call a *brood*, when speaking of chickens—I shall then go on to the technical term for larger collections of game birds, such as we should call flights or flocks, if speaking of small birds; and, lastly, I shall point out to what birds, or animals, the words brace, leash, and couple, are properly applicable.

TURKEYS, a single hatching of, is a *brood*.

*PHEASANTS, “ “ “ *nide*.

*PARTRIDGES, “ “ “ *covey*.

†GROUSE, before they can fly, *brood*.

“ afterward, *pack*.

QUAIL, *bevy*.

WOODCOCK, *brood*.

SNIZE, *brood*.

* Observe here, that neither Partridge nor Pheasant existing in America, the words *nide* and *covey* are useless. What is generally called, therefore, a *covey* of Partridges is a *PACK* of RUFFED GROUSE.

† When we use the term GROUSE alone, the PINNATED GROUSE is understood to be intended.

For large flocks of Wild-fowl, we say of—

SWANS, a *whiteness*.

GEESE, a *gaggle*.

BRENT, a *gang*.

DUCK, a *team*,—smaller number, a *plump*.

WIDGEON, a *company*, or *trip*.

TEAL, a *flock*.

SNIPE, a *whisp*.

PLOVERS, and all Shore Birds, a *flock*.

BITTERNS and HERONS, a *sege*.

LARKS, an *exaltation*.

GROUSE,

PARTRIDGE, } several hatchings united, a *pack*.

QUAIL,

The young, not full-grown, of GROUSE are *cheepers*, of QUAIL *squeakers*, of WILD-DUCK *flappers*.

As many as go together of—

BISON, *vulgo* Buffalo,

STAGS,

MOOSE,

CARIBOO,

} are a *herd*.

ELK,

a *gang*.

WOLVES,

a *drove*.

The female of the—

BISON,

MOOSE,

CARIBOO,

} is a *Cow*.

ELK,

Doe Elk.

STAG, or HART, *Hind*.

BUCK,

Doe.

The terms *Stag* or *Hart*, and *Hind*, are applied to the RED DEER.

" *Buck*, " and *Doe*, " FALLOW DEER.

The Deer of America is nearly akin to the RED DEER, and has no relation to the FALLOW DEER; therefore, unless as applied to the Goat, or Antelope, as a qualification of sex, the words *Buck* and *Doe* are misnomers in American Sporting.

TWO GROUSE,

" PHEASANTS,

" PARTRIDGE,

" QUAIL,

" HARES,

" LEVERETS,

} are a *brace*,—three are a *leash*.

TWO WOODCOCK,

" SNIPE,

" WILD-FOWL of all kinds,

" PLOVER, and Shore Birds,

" RABBITS,

} are a *couple*,—three are a *couple and a half*.

And the applying these terms *vice versa* is a bad sporting blunder. All large game, as Deer, Swans, Geese, Herons, are numbered numerically, as one, two, three, &c.

TWO HOUNDS,

" HARRIERS,

" BEAGLES,

} are a *couple*,—three are a *hurdle*.

TWO POINTERS,

" SETTERS,

" SPANIELS,

" GREYHOUNDS,

" TERRIERS,

} are a *brace*,—three are a *leash*.

All other dogs are reckoned numerically.

By a pack of hounds, five-and-twenty couple is generally understood, though it is not usual to take out, except where the woods are very large and dense, above eighteen or twenty couple.

When a STAG breaks covert the cry is *tayho!*

" FOX " " *talliho! whoop!*

" HARE, found sitting with Harriers, *tantaro!*

" " " with Greyhounds, *soho!*

To make POINTERS, or SETTERS, stand, *toho!*

" " " drop to shot, *charge!*

" " " come behind, *heel!*

" " " careful, *steady!*

" " " rise from the charge, *hold up!*

" " " hunt for killed game, *seek dead!*

" " " when found, *fetch!*

When any animal is killed before hounds, the death halloo is invariably *who-whoop!*

When any animal turns on the hounds, he is *at bay!*

When a STAG is driven by hounds to water, he *soils!*

When a FOX " " to ground, he *earths!*

When an OTTER, after diving, breaks water, he *vents!*

And, lastly, to correct some very common errors of parlance, —A Horse never *runs*; he walks, ambles, trots, paces, canters, gallops. These are all his paces.

A Horse is *by* his sire, and *out of* his dam. Not *vice versa*, as the common phrase goes here.

A male Horse is a *stallion*.

A collection of Horses is a *stud*. The application of the latter term to the male Horse, is not merely *vulgar* squeamishness, but sheer nonsense.

The female of a Fox is a *vixen*; of a Dog, a *bitch*, not a *shut*; and the use of the latter word is far the more objectionable of the two, as implying an improper consciousness.

HISTORY

OF

WESTERN MASSACHUSETTS.

THE COUNTIES OF

HAMPDEN, HAMPSHIRE, FRANKLIN, AND BERKSHIRE.

EMBRACING AN OUTLINE, OR GENERAL HISTORY, OF THE SECTION, AN ACCOUNT OF ITS SCIENTIFIC ASPECTS AND LEADING INTERESTS, AND SEPARATE HISTORIES OF ITS ONE HUNDRED TOWNS.

BY

JOSIAH GILBERT HOLLAND.

In Two Volumes and Three Parts.

VOL. II.—Part III.

SPRINGFIELD:

PUBLISHED BY SAMUEL BOWLES AND COMPANY.

1855.

Dexter Marsh, the collector of the fossils of Connecticut River, died April 2, 1853, aged 47. A brief sketch of the history of these fossils will be proper in this place. A discovery, indicating that birds and other animals inhabited the earth during the deposition of the New Red Sand-stone of the Connecticut River, was made in 1835, in the South-west part of Montague. Their footprints are impressed upon the strata of this rock, in a very perfect state of preservation. The importance attached to these vestiges, lies in the fact, that they reveal the existence of air-breathing, warm-blooded animals, in a period of the earth's antiquity, immensely remote. The discovery of such indications of the higher grade of animal life so low down in the geological series, conflicted with established doctrines, and there was not a geologist in this country, or in Europe, who would admit the manifest conclusion at first drawn from these eloquent inscriptions. The first practical observer of these foot-marks, and the discoverer of the fact that they were the foot-marks of birds, was Dr. James Deane of Greenfield; and it was by his efforts, through the means of descriptions, plaster casts, &c., that the attention of eminent scientific men was drawn to the subject. Dr. Edward Hitchcock of Amherst gave them the first thorough scientific investigation, and first published the discovery to the scientific world. He pursued the investigation of the subject with such care, such nice intelligence, and such thorough method, as forever to identify his name with the discovery and the philosophical conclusions of which it forms the basis:

At a later day the subject attracted the attention of Mr. Marsh, who pursued it with extraordinary vigor and success. Although the gentleman did not possess the advan-

tages of education, yet by untiring activity, and by the acuteness of his judgment, he has been justly regarded as the Hugh Miller of the New Red Sandstone. He was sustained by a singular enthusiasm until, by discovery upon discovery, he contributed a collection of inestimable value to this single department of paleontological science. His cabinet contained the record of innumerable birds, reptiles and fishes; a record of unmistakable truth, that three classes of the animal kingdom flourished in affluent abundance during the sandstone era of the world. At his executor's sale in Sept., 1853, this magnificent collection realized nearly three thousand dollars, a significant evidence of its appreciation by the scientific public. Mr. Marsh originated in Montague, but lived in Greenfield for many years previous to his death.

NEW GRANADA:

TWENTY MONTHS IN THE ANDES.

BY ISAAC F. HOLT, M.A.,

PROFESSOR OF CHEMISTRY AND NATURAL HISTORY IN MIDDLEBURY COLLEGE.

WITH MAPS AND ILLUSTRATIONS.

NEW YORK:

HARPER & BROTHERS, PUBLISHERS.

FRANKLIN SQUARE.

1857.

A boat 30 or 40 feet long, with baggage piled on both sides, with an alley-way of less than three feet in the middle, would be a tolerable prison for seven men, a boy, two servants, the patron, the patrona, and an uncounted lot of bogas, although these last had no rights under or aft of the toldo. But there was a sad drawback on this. There were three beams running across the top of the boat, from side to side, too low to creep under and too high to step over, so that, in fact, we were penned up like animals in a cattle-show.

Such was our home, or our prison, from Monday till Saturday. Once or twice a day we came to land when the bogas' dinner was boiled enough, but as soon as it was eaten they prayed again, and on they went again with an us! us! us! us! us! uh! ! ! jumping and screaming. One black rascal had a string tied round his waist, and tied to it his trunk key. So he has clothes, it seems, somewhere; but when a man has put every rag he has in the world into his trunk, in what pocket shall he put his key? A knotty question, which the fellow seems to have solved completely.

But the most amazing problem of political economy I ever tried to solve is how to nerve a naked vagabond up to almost

THE BOGA.

superhuman exertions, day after day, in a land where starvation is impossible. The boga's task used to be to push his huge champan against a violent current up stream, from Monpos to Honda—a month's dire task of twelve hours' dreadful labor every day, except two or three accustomed stops, where neighbor promises, threats, blaspheming, nor pistols could start him a particle; but you may as well inquire why a man will be a poet, a naturalist, or a book-maker, with the certainty of hard labor and bad pay, as a boga. *Boga nascitur.*

The truth seems to be that our boga is a great sensualist. He has his finery and embroidered shirts, and he must have his dances and drinking frolics. We may suppose him, then, to arrive home with an amount of money that the upland Indian never has seen; but his old debts, and one or two *benders*, make short work with it. Then he resorts to borrowing till

that resource is exhausted, and again he must get a champan; but I must forewarn my readers that the borrowing part of the business will not go far, for the credit system is not well understood in low latitudes. So the river-craft is based on the vice and improvidence of its victims. I see many analogies between bogas, the deck-hands of the Mississippi, and common sailors. The Millennium would involve the reconstruction of many classes of society.

Generally, in all parts of the Magdalena, one bank is steep and the other shallow. The champan chooses the latter, and, when it changes to the other side of the river, we must cross it. All the men on the toldo jump down forward, and each one takes his paddle—canalete. Then we have an intermission of the noise till they are again at their poles. Some of them stand in the proa all the time, and push there. These occasionally exchange the pole for the hook—gancha—and thus, at times, manage to pass a small turn of steep bank, and save crossing the river twice, which is always effected with a great loss of ground.

PLAIN OF MELGAR.

I was desirous that Melgar should gain something by me, but I sought meat, eggs, and fruit in vain. I ate here an orange, but it was so poor I ate it only out of politeness.

My mule recovered her spirits in the pause at Melgar. She trotted on till she came to a large stream, running, as all the others run, toward the river on my right. She crossed the stream, and quietly lay down on her left side, just in the edge of the water. My Endlicher, a twenty-dollar hook, and the dried plants of the last month, were the chief sufferers. It was a long time before we came to a suitable place to stop, but we arrived at 4 P.M. at a very clean house, where I removed the encrudo from the trunk, and exposed the wet contents to the setting sun.

I had bought eight eggs for half a dime before reaching this house. I sent a quarter dime to another place, and the messenger returned with a totuna of milk, and the promise of a like quantity in the morning. I had sugar with me, and, much to the interest of the family, I made a custard in my smaller kettle, which I put in the next larger, filled with water. A bath in

the stream, in which my trunks had been dipped above, consumed the rest of the day. I found my custard creditable to a chemist, and my hammock all that a hammock should be.

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The road of this afternoon was diversified by winding round the bases of mountains. Two plants here interested me. One was of the Cinchonate Order, and had a sprig of small inconspicuous flowers, except that the lower flowers of the raceme had each one lobe of the calyx enormously elongated, and colored bright crimson. I suppose it to be *Calycophyllum coccineum*. I have seen it four times in all, but never have been able to save decent specimens of it. Those that I have I begged from the ornaments of a torch carried one night in honor of Santa Barbara. The other was a Dalechambia, of the Euphorbiate Order, and had what appeared a flower of two red rose leaves. Within was a large gland, with some staminate flowers on one side of it, and pistillate flowers on the other.

I passed a bank where a cow was eating clay, apparently pure and destitute of any saline taste. The bank had been eaten quite away.

I passed the village of Fusagasugá Ferry, so called because the road down the Magdalena there crosses the Suma Paz. I kept on my course without stopping, Roque being half an hour behind. I had got twenty rods from the last house, when a body of men came running after me, calling to me to stop. I asked the reason, but received no answer till they came quite up to me, when a respectable-looking gentleman, feeling called upon to answer, said that they feared that I would lose my way. I replied that I had no fears on that head, and offered to go on,

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REMEDIES FOR SNAKE-BITES.

Once for all, let me say that I have little confidence in snake remedies. The most positive statements in respect to them are often entirely false. It is a general impression that the venom of serpents of different species differs more in power than in nature. This is very doubtful. Sensibility to poison certainly varies in different species. A bite of a rattlesnake that would kill a horse would only make a man deadly sick (with fright perhaps), and would not harm a hog.

A spontaneous recovery from a snake-bite gives reputation to

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an inert remedy. Besides the Mikania Guaco, of which I have never seen the flower, and *Aristolochia anguicida*, also called guaco, there are many other plants that have the same name and the same reputation. All have two distinct colors in the leaf, as has the rattlesnake-leaf of the States—*Goodyera pubescens*. Many rely on the cotyledons of *Sinaba Cedron*, called cedron in New Granada. Besides extraction of poison, and the immediate severing of the bitten limb, I know of no surer way than to combat the symptoms as they appear.

Leaving the broad plains of Murillo to the west, you advance to the Overo. Overo means egg-tree, and has its name from a tree that bears a fruit in shape resembling an egg. Overo has an unfinished church—or chapel I suppose it is, for it is in the district of Buga-la-Grande. You pass a small stream, in a very large bed, having every appearance of being subject to violent freshets, and beyond you come to the Portuuela, the residence of the amiable Dr. Quintero.

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It was sunset when we parted, and I had three miles yet to go to reach La Ribera, the home of the Vargas family, to which I introduced the reader at Cartago. Much of the way was woods, and all of it was mere path, without a regular road. My horse had never been there; but I had been over part of the road four times, and part of it but once, and then with company. Starlight in a tropical forest, far from any house, is nothing to trifle about, especially after you have seen the peasantly skinning a lion. This animal (probably *Felis concolor*, puma, painter, and panther) appears to range from Canada to Patagonia. The individual which I saw was killed in the forest of the river. It seemed little inferior in strength to his African namesake. The *tigre* (*Felis onca*, jaguar, ounce, catamount—if, indeed, these animals are the same all over the continent) is weaker, more agile, and more cruel, as is generally supposed.

I had for my consolation the fact that deaths from wild beasts, venomous serpents, mad dogs, and lightning are very rare among mankind.

"Familiar in their Mouths as HOUSEHOLD WORDS."—SHAKESPEARE.

HOUSEHOLD WORDS.

A Weekly Journal.

CONDUCTED BY

CHARLES DICKENS.

VOLUME III.

NEW-YORK:

ANGELL, ENGEL & HEWITT, PRINTERS & PUBLISHERS.

1851.

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SOUTH AMERICAN SCRAPS.

LA PLATA.

It was in 1848-1849 that I made my visits to the Sierra or mountain, the Pampas or plains, and the Pampas-Indians of the vast province of Buenos Ayres—also called the province of La Plata. I was not thoroughly unacquainted with the general nature or the principal features and remarkable aspect of the scenery and native population of the South American provinces; nevertheless, in the course of these visits, I was struck with as much of novelty and interest by the remarkable objects everywhere around me, as if my mind had not been previously impressed with any preconceived ideas of any of those objects, by means of the general information I possessed. I expected to see an immense river, and many considerable rivers of less magnitude, but whose size, in many European

countries would be estimated as large; but I had conceived no expectation of beholding any so immense as the River Plate, or even as the Uruguay, or the Parana. I likewise expected to view a vast extent of plains proceeding from along the banks of La Plata further than eye could reach—but not an expanse so vast and characteristic as the Pampas. So of the mountains running in the interior of the province, I had no adequate conception of the Sierra.

As an old traveller, I always feel more comfortable, if, before taking a journey into any unexplored region, I ascertain as much as possible of its geography. Possessed of such information, some obstacles have been cleared away from any line of route I may choose; and I certainly feel the safer and more confidence as I proceed through the unknown country. Let me, therefore, before taking you to the Sierra, or beyond, just lead you by the hand, and proceed at a gentle pace to take a bird's eye view of La Plata.

Look first on La Plata as much as you can see of its breadth and its length, and whatever your notion of it may be, I must confess that the more I behold in reality, or in memory, or in description, of this magnificent river, its vastness impresses me more and more with that inexpressible feeling which I think no other object in nature, not even the wildest grandeur of the highest mountains, so powerfully inspires one with, after the first view, as the sublime expanse of waters, though peacefully slumbering in their might, commanding the majesty of silence around.

In breadth, La Plata equals that of the Amazons, and is navigable by vessels of considerable tonnage, even to the distance of four hundred leagues from its mouth. Of its vastness the European traveller will be able to form some idea from the fact, that one of the many tributary rivers flowing into La Plata, the Uruguay, is itself in magnitude one that surpasses the Rhine or the Elbe. In speaking of the Uruguay, it must not be forgotten that at its mouth its breadth is so great that the eye cannot from any point take in both its banks at one view—not even from the centre of the river; and that proceeding two hundred leagues higher up, it requires an hour to cross it.

In another tributary of La Plata, the Parana, itself an immense river, is the great Cataract (situated in the twenty-fourth degree of latitude, not far from the city of Guayra), which, over the extent of twelve leagues, hurls itself with ever-increasing rapidity and impetuosity over and amongst numberless rocks of very singular and startling forms. Of all the tributary rivers, the largest by far, it is asserted, is the Parana; hence the natural designation of La Plata by the natives as the Parana, comprising all the aggregate rivers of La Plata and its tributaries. The Spanish designation, however, appears for geographical purposes the more suitable for

adoption. The Parana—regarding it as a separate, though a tributary river—springs from the environs of Villa del Carmen, to the north of Rio de Janeiro, and in its course flowing through a mountainous country, augments itself immensely, receiving, in its downward progress to the vast plains, numerous other streams. It likewise there receives the Paraguay, which originating in a plain in the north, called Campos-Pareis, that during the rainy season forms the Lake of Xarayes, is greatly augmented before it disengages itself into the Parana, by receiving the Pilcomayo—itsself a large river—which, having its source near Potosi, is the channel of all the inland navigation from the mines. The Vermeigo and the Salado also flow into La Plata from the side of the Andes, and the Uruguay from the side of Brazil.

Bearing in mind, as far as you can, this assemblage of magnificent rivers, and the thousand minor streams perpetually rolling down the divers mountains of the far-extending Sierra, picture an apparently interminable expanse of pampas, or plains not verdant, nor prairie-like in appearance, whose scarcely undulating surface forms a line of horizon scarcely broken, save by abrupt and almost perpendicularly rising mountains of extraordinary form and aspect, and numberless low hills among the intermediate valleys, intersected by innumerable rivers and streams, and covered by multitudes of wild cattle,—and you will then have a very inadequate idea of the vastness, the wildness, the magnificence, and the dreary and awe-inspiring peculiarities of those regions, thus possessed of so many of the grandest elements of picturesque beauty in its more savage aspects.

The apparently interminable Pampas of Buenos Ayres are at a distance of one hundred leagues (three hundred English miles) south from the town of Buenos Ayres, almost equally divided by the remarkable chain of mountains termed the Sierra, which runs from east to west. Taking the south frontier of the Pampas to be the river Colorado, as it is usually considered, but without sufficient reason, we should find that the distance thence to the Sierra is little more than one hundred leagues.

Before I proceeded to the Sierra, I had frequently heard and laughed at one of those trivial little superstitions which the gossips of every country delight in circulating. It is believed that, immediately on the arrival of every stranger who never before has seen the Sierra, it will infallibly rain. Let the learned in meteorology discuss this question if they please; I can, at least, throw in one fact, namely, that for many weeks prior to my arrival at the Sierra, the weather had been continuously dry. I approached the Sierra in the afternoon when it was decidedly fine and dry, as the glass would indicate; nevertheless, very soon after I had reached the Sierra, the heavens became covered with

LAND, LABOR AND GOLD;

OR,

TWO YEARS IN VICTORIA:

WITH

VISITS TO SYDNEY AND VAN DIEMEN'S LAND.

BY

WILLIAM HOWITT.

IN TWO VOLUMES.

VOL. I.

BOSTON:
TICKNOR AND FIELDS.

MDCCC LV.

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It is curious that Dampier in his Voyage round the World in 1688, never mentions the annoyance of flies anywhere but in Australia, though he had been in the hottest regions of the West Indies, South America and the Indian Ocean; which shows that here they are an unexampled plague. Speaking of the natives he says: — 'Their eyelids are always half-closed, to keep the flies out of their eyes; they being so troublesome here that no fanning will keep them from coming to one's face; and without the assistance of both hands they will creep into one's nostrils and mouth if the lips are not shut very close. So that from their infancy, being thus annoyed with these insects, they do never open their eyes as other people, and therefore they cannot see far, unless they hold up their heads as if they were looking at somewhat over them.'

On Futter's Ranges we encountered too, for the first time, the Australian nuisance of grass-seeds. When these become ripe, they are like so many needles; and it is a point to get the sheep washed and clipped before these seeds are ripe, or they fill the wool and ruin the fingers of all who attempt to clean, spin, or weave it. They seem furnished with little barbs or scales, which continually

sheep's

push them forwards on the least motion, so that they are forced through the ship's skins by thousands, and even penetrate to the lungs; for so long as there is any motion

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GRASS-SEED NUISANCE

where they are, they keep travelling forward till they meet with something too hard to penetrate. I have had skins shown to me after the sheep were killed, regularly bristled inside with the points of those vegetable needles. There are cranesbill geraniums also, the seeds of which penetrate the bodies of the sheep, only working forward in corkscrew fashion.

The grass on these hills was up to the waist, and the seeds penetrated our light trousers in all directions, like so many pins. It was intolerable. You could not walk without agony, and we hastened back to the road as fast as possible. Boots, they say, are the only defence against this nuisance, and the ladies in the bush wear tall laced ones. But to be secure from them, men must wear boots to the hips.

The hot weather has spoiled all the water. It is tepid and vapid and bitter. There are no rocks up this road, whence cool water gushes, no deep shaded springs; the only places to get water from are the creeks, and in them the powerful sun drives off all the carbonic acid gas, which should give sharpness and freshness to it; and the thousands of tons of gum-trees lying and rotting in these creeks, make it bitter and unwholesome. We hear that there is fine cool water at the Ovens.

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All the meat that we get at the diggings is intolerably tough, partly because, the diggers say, the squatters are killing off first what they call their hospital flocks — the scabbiest sheep, and those worn to skeletons with foot-rot; and partly because it is obliged to be eaten immediately on account of the heat and the flies, which are truly described by a Melbourne advertiser of wire-gauze dish-covers, as 'the insect pests of Australia.' As for the little black devil fly, I give up all attempts to convey any idea of it as a perpetual torment; and the blow-flies we are quite contented with if they don't fly-blow ourselves. They blow

your blankets or anything that has a particle of woollen in it. The other day, Charlton was skinning a flying squirrel just shot, and it was crawling with live maggots before he had finished. The other day we saw an ox in a dray, which had its eye burst, and there were actually dozens of maggots in it, eating it out. But stranger still, a gentleman in a party working near us, hurt his eye with the handle of a windlass; and the next morning feeling a strange creeping sensation in it, he got up, and to his horror actually saw it alive with maggots.

In truth, this country seems the favorite home of insect life; insects here are endless in numbers and form. Many are most singular and curious; but the ants, the flies, the centipedes, and the scorpions are a terrific nuisance. The bite of all these is severe and venomous. There is a red spider too, whose bite is said to be deadly; but the ants are the most numerous, next to the flies. They cover the

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whole surface of the ground, I might almost say of the whole colony, of all colors and sizes, and almost every

variety of them stings keenly. Nor is it the ground only on which they swarm; there is not a log lying on the ground, nor a tree standing in the forest, up and down which they are not creeping in myriads. Trains of them are constantly ascending to the topmost twigs of the loftiest gum-trees, two hundred and fifty feet high, and other trains descending. They appear to be a main cause of the prevalent hollowiness of the trees, as they pierce to the centre of the youngest ones, and eat out and make their nests in their hearts. They eat the wood of the boughs, so that immense arms often fall off, with a sudden snap, just as if they had been cut asunder by an axe. The other day we cut down a young stringy-bark tree, and split it to make some trestles, and the heart of it was all eaten out and occupied by ants. These insects, many of them an inch long, fiercely contest the ground with us, when we are pitching our tent in any fresh place, and their sting is as severe as that of a wasp.

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That night we encamped in a fine park-like situation, about two miles to the left of Kilmore, and were scarcely settled when it set in heavy rain. All night it was a perfect tempest of violent wind roaring through the woods, and of drenching, driving rain. The next morning it rained till eight o'clock, when it began to snow; and it snowed hard the whole day till three o'clock. At the commencement, the flakes of snow were the largest I ever saw in my life. They were as large as the palm of my hand; and one that I took up from the back of Buff would certainly have weighed half an ounce. As the storm proceeded, the flakes diminished to their ordinary size. By the time it cleared up the snow was three inches deep; and in the defiles of the hills near, the settlers say it was three feet deep in some places. The most remarkable circumstance was the way in which the loads of snow crashed down whole trees, and the huge heads and branches of others. These evergreens, catching and retaining the whole weight of it (and the weight of this heavy, moist snow being great), when well loaded, they began to break off with tremendous reports. All round us in the forests these crashes were heard like repeated volleys of artillery.

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TORMENT OF SAND-FLIES.

In our ride through the iron-bark woods here, our horses were tormented with one of the greatest nuisances of the colony, the sand-flies. These flies are a kind of midge—small, filmy things, like the midges at home; but they are not only extremely keen, but excessively venomous. They are as numerous as the grains of sand in the sterile iron-bark ranges. They cover the whole ground in spring; and, as you advance, they rise up, and cover your horses' legs and chests, and puncture them in such a manner, that their legs are totally covered, in a very few minutes, with blood. The horses, of course, become quite frantic with them, not being able to stand still for a moment; so that it is no trivial matter to go into a wood with them at this season. As the summer proceeds, I expect the birds eat them up; but in spring they are

countless. Their effect on men is much worse than on horses. Wherever they bite the part swells excessively, and becomes a great, livid boil, as large as a walnut. I was bitten on the wrist last summer, in riding on the Sydney border, by one. The next day my hand was enormously swelled; and then the swelling settled into one of these boils, which are very sluggish and difficult to cure. This took more than a month, and would not heal till treated with caustic. Another, this spring, has bitten the other hand; and the venomous bite has gone exactly

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Upper Yackandandah, December 18, 1853.

THIS country is certainly a splendid field for the naturalist. The animals are most curious; the birds are almost endless in variety, singular in habits, and the notes of many of them are peculiarly musical. We find fresh ones in every new part of the country that we visit. The Blue Mountain parrot, a splendid bird of deep red and brilliant blue, has many very musical notes. The flowers of the colony are immensely numerous in species; and, though generally small, many of them are very beautiful. There grows in the woods here a clematis which we have seen nowhere else (*Clematis appendiculata*); a very beautiful thing, with large white and very fragrant blossoms. This clematis hangs on the bushes and young

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trees in lovely masses. There is a plant of it near our tent, running over the fallen bole of a huge blue gum-tree like a garland. It is worthy of a painter. There is also, in the wet places of the woods, a yellow-flowered rush, which smells exactly like pine-apple (*Xerotes longifolia*).

The insects, as I have often said, are countless; swarm everywhere and over everything. Their tenacity of life is most amazing. I have told you of the manner in which one half of a bull-dog ant fights the other if cut in two. I saw an instance of it just now. Our giant cut one in two that was annoying him. The head immediately seized the body with its mandibles, and the body began stinging away manfully at the head. The fight went on for half an hour without any diminished sign of life; and this is what they always do. Instead of dying, as they ought to do, they set to and fight away for hours, if some of the other ants do not come and carry them away; whether to eat them or bury them we know not. But the flies immediately eat flies that are crushed, and ants eat the remains of crushed ants.

A JOURNEY THROUGH

THE CHINESE EMPIRE.

BY M. H. UO,

AUTHOR OF

"RECOLLECTIONS OF A JOURNEY THROUGH TARTARY
AND THIBET."

IN TWO VOLUMES.

VOL. I.

NEW YORK:

HARPER & BROTHERS, PUBLISHERS,

FRANKLIN SQUARE.

1855.

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and our bearers, feeling doubtless, after their thirty hours' rest, the want of a little exercise to put their blood into circulation, set off with us at a round pace. At the moment when they started, Master Ting bawled to them, at the top of his voice, to be sure and take us to the Hotel of Accomplished Wishes.

At the corner of the street, however, we stopped the bearers, and desired them to proceed to the communal palace, for we intended to lodge there, and at no hotel; and they immediately obeyed, while our escort probably directed their steps to the above-named Hotel of Accomplished Wishes. We soon arrived; but there was no appearance of our having been expected, for all the gates of the palace were shut.

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RECOLLECTIONS OF A JOURNEY THROUGH TARTARY, THIBET, AND CHINA,

DURING THE YEARS

1844, 1845, AND 1846.

Erasmiste Régis
BY 'M. HUC,
MISSIONARY PRIEST OF THE CONGREGATION OF ST. LAZARUS.

VOLUME I.

NEW-YORK:
D. APPLETON & COMPANY, 200 BROADWAY.

M. DOOL LIL

[Condensed translation
by Mrs. Percy Sinnett]

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In the deserts of Tartary, not far from the frontiers of China, you sometimes come upon one of these lonely inns, which are composed of an immense quadrangular enclosure, made with long poles interlaced with brambles, in the midst of which stands a house of clay, at the

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utmost not more than ten feet high. This contains a few little miserable chambers on the right and left, and one vast apartment, serving at once for kitchen, refectory, and dormitory, and generally dirty, smoky, and of unsavoury odour. About three fourths of it is taken up by a sort of raised platform about four feet high, and covered with a mat of reeds, over which wealthy travellers also spread their furs and felt carpets. In front of it, fixed in clay, are some immense cauldrons for preparing broth, and with fires beneath, having openings communicating with the interior of the *kang*, as it is called, by means of which, even during the terrible cold of the winter, an elevated temperature is preserved.

As soon as a traveller arrives, the superintendent of the chest invites him to mount on the *kang*; and there you seat yourself, tailor fashion, with crossed legs, round a table about five inches high. The lower part of the hall is occupied by the people of the inn, who come and go, keep up the fire under the kettles, boil the tea, or knead oaten or buck-wheat cakes for the entertainment of the guests. The *kang*, in the mean time, presents an animated scene. The travellers are drinking, smoking, playing, screaming, sometimes even fighting; but, as evening comes on, it is transformed into a dormitory. The travellers unroll their coverings, and range themselves in rows; when they are numerous, in two lines, feet to feet. But, though every one lies down, it by no means follows that every one goes to sleep; for whilst some snore most conscientiously, others continue to smoke, drink tea, and carry on vociferous conversation; and the whole scene is lit by a dim lamp, made of a

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long wick floating in thick, nauseous-looking oil, in a broken cup fixed in a niche.

As we wished to serve our apprenticeship to the Tartar life, we would not sleep in the inn, but pitched our tents outside; and when we had kindled a large fire of brambles, and unrolled our skins, we lay down.

But no sooner had we done so, than the "Inspector of the Darkness" (watchman) began to strike loud blows on the *tam-tam*, a brazen instrument whose sonorous vibrations re-echoed through the valley, and were intended to frighten away the wolves and other wild beasts that frequent these deserts.

The day had scarcely dawned when we were again on foot; but, before setting off, we had to effect a metamorphosis in our costume. The missionaries who reside in China all wear the dress of the Chinese merchants, and have nothing in their costume to mark their religious character. This custom, it appears to us, has been in some measure an obstacle to the success of their missions. For among the Tartars, a "black man," that is, a secular person, who undertakes to speak of religion, excites only contempt. Religion they consider as an affair belonging exclusively to the Lamas. We resolved, therefore, to adopt the costume worn on ordinary occasions by the Lamas of Thibet; namely, a long yellow

robe fastened by a red girdle, and five gilt buttons, with a violet velvet collar, and a yellow cap surmounted by a red rosetta. We also thought it expedient from this time to give up the use of wine and tobacco, and when the host brought us a smoking urn full of the hot wine so much in favour among the Chinese, we signified to him that we were about to change our modes of life, as

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well as our dress. "You know," we added, laughing, "that good Lamas abstain from smoking and drinking." But our Chinese friends regarded us with compassion, and evidently thought we were about to perish of privation.

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The mountain we were climbing is called the Sain-Oula, that is to say, Good Mountain—a strange name, as it is famous for the disasters and tragic accidents met with on it; and the way across it is rough, steep, and encumbered with masses of rock. It is also subject to such excessive cold that no winter passes without many travellers perishing upon it. Instances have been known of whole caravans, men and animals together, being found dead of cold; and to the danger of the temperature are added those of thieves and of wild beasts. The robbers indeed have regularly established themselves here, and lie in wait for travellers going to or coming from the town of Tolon-Noor; and woe to the man who falls into their hands, for they do not content themselves with taking away his money and his goods, but strip him, and leave him to die of cold and hunger. Half way up this "Good Mountain" is a little temple dedicated to the goddess of it, who bears the name of the "Good Woman" (*Sain-Nas*), and in the temple resides a hermit, whose busi-

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ness it is to throw shovelful of earth on parts of the road that the waters have rendered impracticable. This service gives him the right to a small contribution which suffices for his maintenance.

The robbers of these countries are in general remarkable for the politeness with which they flavour their address. They do not put a pistol to your head, and cry roughly, "Your money or your life!" but they say, in the most courteous tone, "My eldest brother, I am weary of walking on foot. Be so good as to lend me your horse!" or, "I am without money,—will you not lend me your purse?" or, "It is very cold to-day,—be kind enough to lend me your coat." If the eldest brother be charitable enough to comply, he receives thanks; if not, the request is enforced by two or three blows of the cudgel, or, if that is not sufficient, recourse is had to the sabre.

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Our entrance into the town of Tolon-Noor* was fatiguing and full of perplexity, for we knew not where to alight. We wandered long through the labyrinth of narrow winding streets, where our camels could not without the utmost difficulty make their way, so encumbered were they with men and goods. At length we found our way to an inn, and, almost without taking breath, unloaded our camels, piled up our baggage in the little chamber assigned to us, ran to the market to buy fodder for our animals, and distributed it among them. The master of the hostelry then came and,

according to custom, presented us with a padlock,—having fixed which on the door of our apartment, we sallied out to look for some dinner for ourselves, for we were excessively hungry. We were not long in discovering a triangular flag, which floated before a certain

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mansion as a sign of its belonging to a house of public entertainment.

We entered a spacious hall, where were distributed with great order and symmetry a number of small tables. We seated ourselves at one, and immediately a teapot was placed before each of us, for this is the obligato commencement of every repast. Before taking anything else you must drink a large quantity of boiling tea. While we were occupied in swelling ourselves out with this beverage, we received the visit of the *Steward of the Table*. This is usually a personage of elegant manners, endowed with prodigious volubility of tongue, who is acquainted with all countries and knows everybody's affairs; but he concludes his harangue by asking for your orders; and, as you name the dishes, he repeats what you say, aloud in a sort of singing voice, for the instruction of the *Governor of the Kettle*. The meal is served with admirable promptitude; but, before commencing, etiquette requires you to go round and invite all the guests in the room to join you.

"Come! Come all together!" you cry. "Come and drink a little glass of wine—eat a little rice."

"Thank you, thank you!" responds the company; "come rather and seat yourself at our table—it is we who invite you:" and then having, in the phrase of the country, "*shown your honour*," you may sit down and take your meal like a man of quality.

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We had never yet traversed such fine countries as these in such fine weather. The wilderness is sometimes terrible, but sometimes also it has its peculiar charms, and the aspect of Tartary is like that of no other country. Among civilized nations you meet with populous towns, a rich and varied culture, countless productions of industry and art, and the incessant agitation of commerce. In those where civilization has not yet made its way, you find vast forests with all the pomp of an exuberant vegetation. But Tartary resembles neither the one nor the other. It is a boundless prairie, sometimes broken up by immense lakes, majestic rivers, imposing mountains, but rolling away always into vast and immeasurable plains. You feel alone in its green solitudes, as in the midst of the ocean.

Sometimes where the water and the pasture is fine, the plain suddenly becomes animated. You see rising on all sides tents of various sizes, looking like inflated balloons, ready to rise into the air. Children with a sort of scuttle on their backs are running about looking for argols, which they pile up round the tent. The

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matrons attend to the young calves, boil the tea in the open air, or prepare the milk; whilst the men, mounted on fiery horses, and armed with a long pole, gallop about in all directions, directing the movements of the vast flocks, which seen in the distance appear to undulate like the waves of the sea.

Sometimes these animated pictures disappear on a sudden; men, tents, flocks, all have vanished, and nothing is left but heaps of cinders, half extinguished fires, and bones for which the birds of prey are fighting. These are all the traces that the nomadic Mongol has passed that way. The flocks and herds have devoured the grass, the chief has given the signal for departure, and the community has gone to seek elsewhere "fresh fields and pastures new."

The next day, all the time that could be spared from our little housekeeping, and the recitation of our breviary was devoted to visiting in the Mongol tents. We found it needful, on approaching them, to look to the safety

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of our legs, for enormous dogs rushed out of them, with great fury, whenever we approached them. A small stick was sufficient for our defence, but we had to lay it down at the threshold of each habitation, in compliance with Tartar etiquette; for to enter a tent with a whip or stick in your hand, would be to offer the most outrageous affront to its inmates, and imply, in their own figurative style, that they were all dogs.

The Tartar mode of presenting one's self is frank, simple, and free from the innumerable forms of Chinese courtesy. On entering the tent, you wish peace to everybody in general, saying *Amor* or *Mendou*, and then go at once and seat yourself at the right hand of the head of the family, who is crouching down opposite the door. A little tobacco is then mutually presented, and a few polite commonplaces exchanged. "Are your pastures fat and abundant?"—"Are your flocks in good order?"—"Have your mares been fruitful?" &c., pronounced with extreme gravity, and then the lady of the tent stretches out her hand towards the strangers, without speaking, and forthwith they produce the little wooden bowl, which is an indispensable *vade mecum* in Tartary, and she returns it to them filled with tea and milk. In tolerably opulent families, a tray is usually placed before visitors, with a modest collation of butter, oatmeal, and slices of cheese, all in separate boxes of varnished wood; and those who mean to be magnificent in their hospitality, plunge into the warm ashes near the fire a small earthenware bottle full of Mongol wine, a sort of spirit rudely distilled from milk, which one must have been born a Tartar to relish.

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and this opinion was confirmed by the immense flocks of sheep and herds of oxen and horses which were grazing around. Whilst we were reciting our breviary in the interior of our tent, Samdachienba went to pay a visit to these Mongols, and we soon saw him returning towards us, accompanied by an old man with a long white beard, and a young Lama leading by the hand a child.

"My Lord Lamas," said the old man, "all men are brothers; but those who dwell beneath tents are united as the flesh and the bone. My Lord Lamas, come and seat yourselves in my poor dwelling. The fifteenth of the month is a solemn epoch; you are travellers and strangers; you cannot this evening occupy your place at the fireside of your noble family. Come and repose yourselves for some days amongst us. Your presence will bring us peace and happiness." We told the good

old man that we could not quite accept his offer, but that in the evening after prayers we would come and take tea with him, and have a chat about the Mongol nation. The venerable Tartar retired, but soon after the young Lama who had accompanied him re-appeared, saying that we were expected. We did not like to persist in refusing an invitation so pressing and cordial, so having recommended the Dehialour to watch carefully our abode, we followed the Lama to the Mongol tent.

On entering, we were surprised to find in it a cleanliness to which one is little accustomed in Tartary. There was no fire in it either, and we nowhere perceived any of the coarse cooking utensils which usually encumber Tartar habitations: it was easy to see that all had been arranged for a state occasion.

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We seated ourselves on a red carpet, and there was soon brought from a neighbouring tent, which served as a kitchen, tea with milk, rolls fried in butter, cheese, dried grapes, and sweetmeats.

We then made acquaintance with the numerous Mongol circle in which we found ourselves, and had a long conversation, from which it appeared that the old man was the only one of the company who was aware that the terrible remembrance of the Tartar massacre was associated with this festival. But after a moment's silence he said—"Holy men, however that may be, the day on which you have deigned to descend into our poor habitation is truly a day of rejoicing, and it is not well to occupy the heart with sad thoughts.—Child," he added, turning to a man who was seated near the threshold—"if the mutton is sufficiently boiled, take away the milk food." And whilst the person addressed cleared away the first course, the eldest son of the family entered, bearing a small oblong table, on which was placed an entire sheep, cut into four quarters. He placed the table in the midst of the circle, and immediately the head of the family, arming himself with the knife that was suspended at his girdle, cut off the tail of the sheep, divided it into two parts, and offered one to each of us.

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On the day following the fête the sun had scarcely risen, when a young child appeared at the entrance of our tent, carrying a small wooden vessel filled with milk, and having suspended on his arm a basket of reeds containing some new cheese, and a slice of butter. Soon afterwards came an old Lama, followed by a Tartar, with a sack of argols on his shoulders. We invited them to sit down in our tent, and the old Lama said—"Brothers of the West, deign to accept these little offerings which our master sends you."

We signified our thanks, and Samdadchiemba made haste to get tea ready, but when we pressed the Lama to wait for it he said—"I will come back this evening, but I cannot at this moment accept your offer. I have not yet marked for my pupil the prayer which he is to study during the day," and as he spoke he pointed to the young child who had brought the milk, and taking his pupil by the hand, he returned to his habitation. This old Lama was the preceptor of the family, and it was his business to direct the child in the study of the Thibetan prayers. The education of the Tartars is very limited. Those only who shave their heads, learn to

read and to pray, and, with the exception of the rich who let their children study at home, all the young Lamas have to go into the convents, where alone any vestige of learning or science is to be found. The Lama is not only the priest, he is the physician, architect, sculptor, painter,—he is the head, the heart, and the oracle of the laity.

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The young Mongol who does not enter into a convent is taught from his infancy the use of the bow and arrow, the gun, and especially the horse, on which he is placed almost as soon as he is weaned. He is first set on a crupper behind the person who is to teach him, to whose robe he clings with both hands; but he soon becomes accustomed to the movement of the animal, and at last almost identifies himself with his steed.

There is scarcely a prettier sight than that of a Mongol pursuing an unbroken horse. Armed with a long heavy pole, at the end of which is a cord with a running knot, they throw themselves on the traces of the wild horse, dash down into rugged ravines, or along the declivities of mountains, and follow every turn till they come up with the chase; then they take the bridle in their teeth, seize the pole with both hands, and, leaning forward, dexterously fling the cord over its neck. It will often happen that the cord or the pole will break, but I have never seen the cavalier dismounted.

A Mongol seems out of his element when he sets his foot on the ground; his step is heavy; the bowed shape of his legs—his bust always stooping forward—his eyes moving incessantly about,—all announce a man who passes the greater part of his life on a horse or on a camel.

When the Tartars travel during the night, it often happens that they do not give themselves the trouble to dismount in order to sleep; and you may see a caravan stop when it has reached a fat pasture, and the camels disperse themselves this way and that, and begin to graze, while the Tartars, astride between their

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humps, are sleeping as soundly as if they were in their beds.

This incessant activity contributes much to render the Tartar vigorous, and capable of enduring the utmost cold without being in the least inconvenienced.

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As soon as ever we returned, we began our preparations for departure; and while we were in the interior of the tent, putting our things in order, Samdadchiemba went in search of the animals that were grazing in the environs. A minute after he returned, leading the three camels, and crying out, in a dismal voice, "Here are the camels, but where are the horse and the mule? They were here but just now, for I tied their feet to hinder them from running away: they must have been stolen. It is never right to encamp near Chinese. Don't every one know that the Chinese in Tartary are all horse-stealers?"

These words came like a clap of thunder on us, but it was not the moment to give ourselves up to lamentation; it was necessary to go immediately in search of the thieves.

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kid, but because the eagle, as he rose, had given him a

box on the ear with the end of his wing.

This accident rendered us more cautious in future. During our journey we had observed more than once eagles hovering over our heads, as if to spy our dinner hour; but our oatmeal did not tempt the royal bird.

The eagle is very frequently met with in the deserts of Tartary. They are never shot at, but make their nests, rear their young, and grow old, without encountering any persecution from man. When resting on the ground there are some which appear larger than an ordinary sized sheep; but before they can launch into the air they are obliged to make a long course, agitating their wings as they go; after which, when they have once cleared the earth, they rise as high as they please in the aerial space.

After some days' march we quitted the country of the Eight Banners and entered Western Toumet.

The Mongol Tartars of Western Toumet are not nomadic: they cultivate the earth, and apply themselves to the arts of civilized life. We had been more than a month in the desert; our taste had been insensibly modified, and our temperament accommodated by its silence and solitude, and, on re-entering cultivated lands, the agitation, perplexity, and turmoil of civilisation oppressed and suffocated us; the air seemed to fail us, and we felt every moment as if about to die of asphyxia. The sensation, however, was of no long duration. After a time we found it more convenient and more agreeable after a day's march to take up our lodging at an inn, well warmed, and well stocked with provisions, than

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have a tent to pitch, fuel to collect, and our scanty supper to cook, before we could take a little rest.

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There is only one which lodges simple travellers, and this is called the inn of passing travellers.

We were inquiring for this inn, when a young man darted out of a neighbouring shop, and accosted us officiously. "You are looking for an inn," said he; "permit me to conduct you to one myself;" and he began to walk by our side. "You will have a difficulty in finding what you want in the Blue Town. Men are innumerable here, but there are good and bad men, are there not, my Lord Lamas? and who does not know that the bad are always more numerous than the good. Listen while I say a word to you from the bottom of my heart. In the Blue Town you will hardly find a man who is guided by his conscience, yet conscience is a treasure. You Tartars, you know what conscience is. I know the Tartars, they are good, they have upright hearts; but we Chinese, we are wicked, we are rogues. In ten thousand Chinese you will scarcely find one who has a conscience. In this Blue Town almost every one makes a trade of cheating the Tartars, and getting hold of their money."

Whilst the young Chinese was uttering all these fine words in an easy off-hand manner, he turned from one to the other, sometimes offering us snuff, sometimes tapping us gently on the shoulder in token of comradeship, and then, taking hold of our horses by the bridle, insisted on leading them himself. But with all these obliging attentions, he never lost sight of the two large

trunks carried by our camel. The loving looks that he cast on them from time to time told plainly enough that he was speculating on their contents: he fancied,

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doubtless, that they were filled with precious merchandise of which he hoped to obtain the monopoly.

We had been now on the road for more than an hour, and saw no signs of the inn promised with so much emphasis. "We are sorry," said we to our conductor, "to see you take so much trouble. If we did but see whither you are leading us——"

"Leave that to me, my lords, leave it to me; I am taking you to a good, to an excellent inn; don't say I am taking trouble; don't pronounce such words: they make me blush. Are we not all brothers? what signifies the difference of Tartar and Chinese? The language is not the same, the habits are not alike; but we know that men have but one heart, one conscience, one invariable rule of justice. Stop! wait for me one moment, my lords; I will be with you in a moment," and he darted like an arrow into a shop. In a few minutes he returned, making a thousand excuses for having kept us waiting.

"You are very tired, are you not? oh! that is easily understood: when one is travelling it is always so; it is not like being in one's own family."

Whilst he was speaking we were accosted by another Chinese; he had not the joyous expansive countenance of our first acquaintance: he was thin and emaciated; his lips were small and pinched together; and his little black eyes deeply sunk in their orbits gave his physiognomy a decided expression of villany.

"My Lord Lamas, you are here at last," said he; "you have made the journey in peace; ah! that is well. Your camels are magnificent; you must have travelled quickly and fortunately. At last you are here; that's

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well. So Eul," added he, addressing the individual who had first seized upon us, "take care that you take these noble Tartars to a good inn; you must take them to the inn of Eternal Equity."

By dint of looking on all sides, we at last espied a sign, on which which was written in large Chinese characters, "Hotel of the Three Perfections, lodging for travellers on Horse or Camel; all sorts of business negotiated with Unfailing Success."

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"Let me make the reckoning," said he; and he took the *sovan-pan*, and his calculation agreed with ours! The intendant made us a profound bow.

"My Lord Lamas, your mathematics are better than ours,"

"No, it is not that; your *sovan-pan* is excellent; but was there ever a calculator who never made a mistake! You might make one mistake; but we, unskilful as we are, might make a thousand. If we are right in this instance, it is a piece of good fortune." These words, under the circumstances, were rigorously exacted by Chinese politeness. When a person has compromised himself, one must avoid putting him to the blush, or, in Chinese phrase, carrying away his face.

When our words had "*covered all their faces*," the piece of paper on which we had traced the figures was eagerly seized upon. "This is an excellent *souan-pan*," said they to one another; "it is simple, sure, and expeditious. My Lord Lamas, what do these characters signify?"

"This *souan-pan* is infallible; these characters are the same as those used by the Mandarins * of celestial literature to calculate eclipses and the course of the seasons."

After a short dissertation on the merits of the Arabian ciphers, our sapecks were counted out to us very exactly, and we took leave.

As soon as we had got our money, we went to provide ourselves with our winter garments; and, remembering the slenderness of our resources, we resolved to apply to a dealer in second-hand clothes. In China or

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in Tartary no one feels the slightest objection to this proceeding. Those who have visits of etiquette to pay, or a fête to attend, borrow without hesitation a hat, a pair of trousers, shoes or boots, as the case may be: there is but one cause of hesitation ever felt in these mutual lendings—and that is, the fear that the borrower may sell them for his own profit or to pay his debts, after he has done with them. They make no more difficulty of wearing another man's trousers, than of living in another man's house.

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The Lamas who flock to the Blue Town from all parts of Tartary, rarely settle there definitely. After having taken their degrees in the sort of universities there, they return home; for they generally prefer the smaller establishments, of which there are such numbers in the "*Land of Grass*." The life they lead there is more free, and more conformable to the independence of their disposition. Sometimes they live in their own families, employed, like other Tartars, in the care of their flocks and herds, and prefer the abode of the tent to that of the convent with its rules and daily recitation of prayers. These Lamas have lit-

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tle of the monk but the habit, and are called Home Lamas.

The second class is composed of those who neither reside with their families nor in convents; these are the *Vagabond Lamas*. They live like migratory birds, without ever settling any where. They travel about apparently for the sake of travelling; they wander from convent to convent, stopping on the road at all the tents they meet with, relying on the never-failing hospitality of the Tartars. There they seat themselves by the hearth without ceremony, and, while drinking their tea, enumerate with pride the countries they have traversed. If the fancy takes them to pass the night in the tent, they stretch themselves in a corner and sleep till the morning. When they do set off at last all paths seem the same to them. They walk with downcast eyes, a long staff in their hands, and a goat-skin wallet on their back. If they are fatigued, they take their rest at the foot of a rock, on the top of a mountain, at the bottom of a ravine, wherever chance or their inconstant fancy leads them.

The vagabond Lamas visit all the countries accessible

to them—China, Mantchuria, Khalkas, Southern Mongolia, Ounang-Hai, Kou-Kou-Noor, north and south of the Celestial Mountains, Thibet, India, and sometimes even Turkistan. There is not a river they have not crossed; a mountain they have not ascended; a Grand Lama before whom they have not prostrated themselves; a people among whom they have not lived, and of whom they do not know the manners and the language. Losing their way in the desert is not possible, since all ways are alike to them. Travelling without any object, the pla-

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ces they arrive at are always those where they desire to go. The legend of the Wandering Jew is exactly realised in the persons of these Lamas. One would say they are under the influence of some mysterious power, which drives them incessantly onward; and it seems as if God had caused to flow in their veins something of that motive force which urges worlds forward in their course, without ever permitting them to rest.

The Lamas living in community compose the third class. A Lamaseraï, or Lama convent, is a collection of little houses, built round one or more Buddhist temples: these habitations are more or less large and handsome, according to the means of the proprietors. They are permitted to keep some cattle; cows for the supply of milk and butter, which form their staple food; a horse to visit the desert; and sheep for their regale on fête days.

In general, all these establishments are royal or imperial foundations, of which the revenues are distributed at certain periods among the Lamas, according to their rank in the hierarchy. Those who have the reputation of being good physicians, or good *fortune-tellers*, have many opportunities of profit besides; but they rarely become rich nevertheless. Their general character is childish and improvident; and they spend their money as readily as they gain it. A Lama who has appeared the evening before in garments both torn and dirty, will the next day, perhaps, rival the highest dignity in the convent in the richness of his habit. As soon as he has any money at his disposal, he runs to the nearest trading town, and equips himself from head to foot magnificently; but it is always probable that he will not keepi

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his fine clothes long enough to wear them out. After some months, he betakes himself anew to a Chinese station, not to play the *elegant* among the fine silk warehouses, but to pledge his yellow robes at the Mont de Piété, whence he rarely redeems them. The shops of the dealers in second-hand clothes in the Tartar-Chinese towns are encumbered with the spoils of Lama wardrobes.

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On the second day after our departure, we met at one of these inns a very curious personage.

We had just finished feeding and tying up our camels, when we saw coming into the large court-yard an enormously fat traveller, who led after him by the bridle a very lean horse. He wore a large straw hat, with brims so broad that they hung down on his shoulders, and he had a long sabre attached to his girdle which did not at all look in keeping with his jolly physiognomy.

"Steward of the kettle," said he, as he entered, "is there room for me in this inn?"

"I have but one room to give to travellers," was the reply, "and that is at present occupied by three Mongol men who have just arrived. Go and see whether they can receive you."

The new comer trudged, with a heavy step, towards the place where we were already installed.

"Peace and happiness to you, my Lord Lama," said he, addressing us as he entered; "do you occupy

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all the room in this apartment, or is there a little left for me?"

"Why should there not be some for you, since there is for us?" we replied. "Are we not all travellers alike?"

"Excellent words, excellent words! You are Tartars, I am a Chinese; but you understand the rites of politeness—you know that all men are brothers:" and with these words he went to tie up his horse by the side of ours, and then, returning, deposited his baggage on the *Kang*, and stretched himself upon it at full length like a man tired out.

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"What! don't you know the Tartars?" was the answer. "Don't you know that they are simple as children, when they come into our towns?—They want to have everything they see—they seldom have any money, but we come to their help. We give them goods on credit, and then of course they must pay rather high. When people take away goods without leaving the money, of course there must be a little interest of thirty or forty per cent. Then, by degrees, the interest mounts up, and you come to compound interest; but that's only with the Tartars. In China the laws forbid it; but we, who are obliged to run about the Land of Grass—we may well ask for a little extra profit. Isn't that fair? A Tartar debt is never paid—it goes on from generation to generation; every year one goes to get the interest, and it's paid in sheep, oxen, camels, horses,—all that is a great deal better than money. We get the beasts at a low price, and we sell them at a very good price in the market. Oh! it's a capital thing—a Tartar debt! It's a mine of gold."

The *Yao-Chang-Ti* (collector of debts) accompanied this explanation of his mode of doing business with peals of laughter. He spoke the Mongol language very well, and it was easy to see that a Tartar debtor who should fall into his hands would find himself in no pleasant position. He was truly, as he said in his picturesque style, "an eater of Tartars."

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Every thing in the world is relative; and the interior of our tent, which would have made a European laugh, excited the admiration of the Tartars who came sometimes to pay us a visit. The cleanliness of our wooden saucers—our well-scoured kettle—our clothes, which were not quite encrusted with grease—all contrasted with the disorder, dirt, and confusion of the Tartar abodes.

When we had set our room to rights, we said our prayers together; and then we dispersed, every one his

own way, into the desert, to pursue his meditations on some holy theme. Oh! there needed not, in the profound silence of these vast solitudes, a book to suggest to us a subject of prayer! The emptiness of earthly things—the majesty of God—the inexhaustible treasures of His providence—the brevity of life—the importance of labouring for a world to come—and a thousand other salutary thoughts, came of themselves, without effort on our parts. It is in the desert that the heart of man is free, and is not subjected to any kind of tyranny. Far from us were the hollow systems, the Utopias of imaginary happiness, which continually vanish as you seem to grasp them—the inexhaustible combinations of selfishness, the burning passions which in Europe clash and irritate each other perpetually. In the midst of our silent meadows, nothing disturbed our just appreciation of the things of this world as compared with those of eternity.

The exercise that followed this meditation was not, it must be confessed, of a spiritual character; but it was very necessary, and it had its charms. Each of us

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took a sack on his back, and went out in various directions in search of argols. Those who have never led the nomadic life will have some difficulty in comprehending how this kind of occupation can be susceptible of enjoyment. Yet when you have the good fortune to find suddenly among the grass an argol remarkable for its size and dryness, you experience of those sudden pleasurable emotions that for the moment make you happy. It is much the same pleasure that the hunter has in finding tracks of the game he is pursuing, or the child in discovering a bird's nest.

When our sacks were full, we used to go with pride to empty them at the door of the tent; then we struck a light, built up our fire, and, while the water bubbled in the kettle, we kneaded our flour up into little cakes, and put them to bake amongst the ashes. The repast was simple, but it had an exquisite relish; for we had prepared it ourselves, and we had appetites that made sufficient seasoning. After breakfast, while Samdadchiemba was bringing back the animals from their pasture, we recited a portion of our Breviary. Towards noon we permitted ourselves a short but sound sleep, which was never interrupted by nightmare or painful dreams. This was necessary, as we sat up very late at night; for we could not give up the enjoyment of the beautiful moonlight shining on the waters. All day there was the deepest silence in the desert; but, as the shades of night came on, the scene became animated, and even noisy. Aquatic birds arrived in countless troops, and soon millions of hoarse and screaming voices filled the air with their wild harmony. In listening to the angry cries and passionate accents of these

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creatures, as they disputed for the tufts of grass on which they wished to pass the night, one could not help thinking of a nation in the wild transports of civil war, in which each is endeavouring to snatch, by violence and clamour, some small portion of the goods of this life—itsself brief as a passing night.

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He was going through a religious exercise

much practised by the Buddhists—that of going round the convent, prostrating himself at every step. Sometimes an immense number of devotees will be going through their act of devotion at the same time, one after the other, and they will include all the neighbouring buildings in their prostrations. It is not permitted to diverge in the smallest degree from the straight line to be followed; and should the devotee happen to do so he loses the benefit of all the exercises he has gone through. When the buildings are of great extent, a whole day will hardly suffice to make the tour with all the necessary prostrations; and the pilgrims who have a taste for this kind of devotion must begin at day-break, and will not have done till after nightfall. The

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feet must be performed all at once without any interruption, even that of stopping for a few moments to take nourishment; and the prostrations must be perfect, that is to say, the body must be extended its whole length, and the forehead must touch the earth while the arms are stretched out in front and the hands joined. Before rising also the pilgrim must describe a circle with two ram's horns which he holds in his hands. It is a sorrowful spectacle, and the unfortunate people often have their faces and clothes covered with dust and sometimes with mud. The utmost severity of the weather does not present any obstacle to their courageous devotion, but they continue their prostrations through rain and snow and the most rigorous cold. Sometimes the additional penance is imposed of carrying an enormous weight of books on their backs; and you meet with men, women, and even children sinking under their excessive burdens. When they have finished their tour they are considered to have the same merit as if they had recited all the prayers contained in the books they have carried. Some content themselves with taking a walk round the convent, rolling all the while between their fingers the beads of their long chaplet, or giving a rotatory movement to a kind of *praying mill*, which turns with incredible rapidity. This instrument is called a *Chu-Kor*, that is, "turning prayer;" and it is common enough to see them fixed in the bed of a running stream, as they are then set in motion by the water, and go on praying night and day, to the special benefit of the person who has placed them there. The Tartars also suspend these convenient implements over their domestic hearths that they may be put in motion by the

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current of cool air from the opening of the tent, and so twirl for the peace and prosperity of the family.

Another machine which the Buddhists make use of to simplify their devotional activity is that of a large barrel turning on an axis. It is made of thick paste-board, fabricated of innumerable sheets of paper pasted one on another, and upon which are written in Tibetan character the prayers most in fashion. Those who have not sufficient zeal or sufficient strength to place on their backs an immense load of books, and prostrate themselves at every step in the mud, adopt this easier method, and the devout can then eat, drink, and sleep at their ease, while the complaisant machine does all their praying for them.

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This want of good pastures

and fresh streams is very unfavourable to cattle, but the camel makes amends to the Tartars of the *Ortoos* for the absence of the rest. It is the real treasure of the desert; it can remain fifteen days or even a month without eating or drinking, and however miserable the country, it always finds something to satisfy it, especially if the soil is impregnated with salt or nitre; plants that other animals will not touch, brambles or even dry wood, serve it for food. Yet little as it costs to keep, the camel is more useful than can be imagined out of the countries where Providence has placed it. Its ordinary burden is seven or eight hundredweight, and thus laden it can go forty miles a day. In many Tartar countries they are used to draw the coaches of the kings or princes, but this can only be on flat ground, for their fleshy feet would not permit them to ascend hills and draw a carriage after them.

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"We Tartars," said he, "do not kill in the same way

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as the Chinese. They make a cut in the neck, we go right to the heart; the animal suffers less, and all the blood remains neatly inside."

As soon as the "transmigration" was effected, none had any further scruple. Samdadchiemba and the Lama immediately tucked up their sleeves and came to the help of the little butcher, and the animal was skinned with admirable celerity. In the mean time, the old Tartar woman had water boiling in the two sauce-pans; and taking possession of the entrails, washed them slightly, and then with the blood which she took from the inside of the sheep with a wooden spoon, she prepared some puddings of which the everlasting oatmeal formed the basis.

"My Lord Lamas, shall I bone the sheep?" asked the little black man. On receiving an answer in the affirmative, he caused the carcase to be hung up (he was not big enough to do it himself), and mounting on a large stone, he detached the flesh in a single piece, leaving only a well polished skeleton behind.

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The Tartar monarch was seated cross-legged; he looked about fifty years of age, and his physiognomy was extremely good.

As we passed, we cried out, "King of Alechan, may peace and happiness attend thy steps!"

"Men of prayers," he replied, "rest in peace!" and accompanied his words by a gesture full of amenity. An old Lama, with a long white beard, and mounted on a magnificent camel, led the first mule of the caravan. The grand marches of the Tartars are generally under the guidance of the oldest Lama in the country, as these people are persuaded that they have nothing to fear on the road, so long as they have at their head a representative of the divinity, or rather the divinity himself incarnate in the person of a Grand Lama.

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the West with them, simply means Thibet, and some surrounding countries of which they have heard from the Lamas, who have made the pilgrimage to *Lha-Ssa*. They firmly believe that there is nothing beyond Thibet. "The world ends there," say they, "beyond there is nothing but a shoreless sea."

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As soon as we had crossed the Hoang-Ho, we entered a little frontier town of China, called *Chè-Tsiu-Dzé*, which is only separated from the river by a sandy marsh. We took up our abode at the *Hotel of Justice and Mercy*, a large house newly built of wood, except a solid foundation of grey brick. The innkeeper received us with the eager courtesy which is usually displayed in establishments of this kind which the owner is endeavouring to bring into fashion; but the countenance of the host, it must be owned, did not afford him much assistance in his attempts to be agreeable.

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We rested and refreshed ourselves for two days at the *Hotel of Justice and Mercy*, and then we set out again. The environs of *Chè-Tsiu-Dzé* are uncultivated, and consist only of sand and gravel brought down every year by the Yellow River; but by degrees, as you advance, the ground rises, and the soil improves. About an hour's march from the town we crossed the Great Wall, or rather we crossed some miserable-looking ruins which mark the site

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Could we not manage the matter quietly, like brothers?"

"Oh! that indeed!" we said. "Men ought always to act like brothers; that is the true principle. When we are travelling, we ought to know how to live with travellers; if every one will put up with a little inconvenience, every one at last will be at his ease."

"Excellent words! excellent words!" and the most profound bows recommenced on either side.

As soon as we had come to this amicable arrangement, we began to discuss, in the pleasantest manner, the method of disposing ourselves in the inn of the Five Felicities. It was agreed that we should keep the room where we were already installed, and that we should tie up our camels in the corner of the court, in such a manner as they should not frighten the mandarin's horses. The courier was to do as he pleased with the rest of the house.

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As we advanced, the mountains gradually declined to hills, the sand diminished in quantity, and towards the end of the day we reached a village whose Chinese appellation signifies "Waters always flowing," and which was a real oasis of exquisite beauty. The houses were built of the living rock, and often painted white or red; and the numerous trees and rivulets flowing through the streets give it a most picturesque aspect. Exhausted with fatigue as we were, the pleasure of arriving at such a place as the "Waters always flowing" is indescribable, and we were in a position to estimate all its delights. But our poetical enjoyment only lasted till the time came for settling with the innkeeper. As all the provisions, and even the fodder for the animals, had to be fetched from Chong-Wei, they were so frightfully dear as to overthrow entirely our plans of economy. For ourselves and our beasts we had to pay almost eight francs. Had it not been for that, we should have grieved at quitting this charming village. But there is always some motive which aids men to detach themselves from the things of the world.

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After having thoroughly rested from our fatigues, we set out at an early hour on the following morning. Everywhere traces of the ravages of the evening before met our eyes; there were trees broken or torn up by the roots, houses stripped of their roofs, and fields of their vegetable covering. Before the close of day, we arrived at Choang-Long, a rather flourishing commercial town. We went to lodge at the "Hotel of Social Relations," and found the landlord very amiable, but very satirical,—evidently a pure Chinese. To give us a proof

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of his penetration, he asked at once whether we were not English (*Ing-Kie-Li*), the marine devils who were making war at Canton.

"We are not English," we replied; "nor are we devils of any sort—land or sea."

"Don't you know," said a man who was lounging about, addressing the landlord, "that all those marine devils have blue eyes and red hair?"

"Besides," said we, "if we were marine monsters, how could we live on shore, and go on horseback?"

"Yes, that's true, that's true," said he; "the *Ing-Kie-Li* never dare to quit the sea; as soon as ever they come on shore they tremble and die like fish."

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"We are not Russians," said we. "Our country is a long way from them."

This answer seemed to surprise him. "From what country are you, then?"

"We are from the sky of the West."

"Ah! then you are from *Peling*" (the Thibet word for Hindostan),—"from the Eastern Ganges,—and the town you inhabit is called *Galgata*" (Calcutta).

The Buddha could, of course, only class us among the nations he knew; and in considering us first as Russians, and then as English, he afforded a proof that he was not entirely ignorant. We could not make him understand precisely who we were: "But after all," said he, "what does it matter from what country you are, since all

men are brothers? As long, however, as you remain in China, you must be prudent, and not tell everybody who

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you are. The Chinese are suspicious and wicked, and they might injure you." He then spoke to us of the route to Thibet, and of the terrible journey we should have to make to get to it;—seeming to doubt whether we were strong enough for such an undertaking. The words and the manner of this Grand Lama were full of affability, but we could not accustom ourselves to the strange look of his eyes. Had it not been for this peculiarity, which after all, perhaps, depended on certain prejudices on our part, we should have thought him very amiable.

• We found on examination that our horse and mule had both large tumours on their flanks, caused by the friction of the saddle, and we therefore determined to make some stay at this place in order to try and cure them. As we wished, however, to find ourselves another abode, we set off on a tour of inspection through all the inns in the town, and at last determined to stop at the "Hotel of Temperate Climates."

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We shall afterwards have occasion to enquire whether the numerous relations existing between Buddhism and Catholicism are likely to prove an obstacle, or an advantage, to the propagation of the true faith in Tartary and Thibet. It is to a legend concerning Tsong-Kaba that the Lamaseraï of Kounboun owes its name. It signifies "Ten Thousand Images;" and it is said that when the mother of the reformer, in devoting him to a religious life, according to custom cut off his hair and threw it away, a tree sprang up from it, which bore on every one of its leaves a Thibetan character. This tree is still to be seen at the foot of the mountain on which the principal Buddhist temple stands, in a large square enclosure formed by four brick walls. Within this stands the wonderful

tree, which appears of great antiquity; and though now not more than eight feet high, three men could hardly embrace its trunk. The wood is of a reddish colour, and exquisite odour, very much resembling cinnamon. We were told that during the summer, towards the eighth moon, it produces superb large red flowers; but what most excited our astonishment was that every leaf

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was really, as we had been before told it was, distinctly marked with a Thibetan character, sometimes lighter, sometimes darker than the leaf, but quite plain. After the most minute investigation, we could discover no traces of fraud on the part of the Lamas; and though, doubtless, people will smile at our ignorance, that will matter little if they do not suspect the veracity of our account.

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The Thibetan women adopt a custom, or rather submit to a regulation certainly unique in the world. Before going out of their houses, they rub their faces with a sort of black sticky varnish, a good deal like conserve of grapes. As the object is to render themselves hideous, they daub their faces with this disgusting cosmetic, till they scarcely resemble human creatures. The following was, we are told, the origin of this monstrous practice.

About 200 years ago, the Nomekhan or Lama king of Anterior Thibet, was a man of the austere character. At that period, the Thibetan women were not more in the habit of trying to make themselves look uglier than the women of other countries; on the contrary, they were extravagantly addicted to dress and luxury. By degrees, the contagion spread even to the holy family of the Lamas; and the Buddhist convents relaxed their discipline, in a manner that threatened a complete dissolution. In order to arrest the progress of this alarming libertinism, the Nomekhan published an edict, forbidding women to appear in public unless disfigured in the fashion above mentioned; the severest punishments and the heaviest displeasure of Buddha were threatened to the refractory. It must have required no ordinary courage to publish such an edict; but that the women obeyed it was still more extraordinary.

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The fair Thibetans vie with each other in making themselves frightful, and she who is most offensively besmeared passes for the most pious; the custom appears to be considered as a dogma to be accepted. In the country the law is most rigorously observed; but at Lha-Ssa, women are to be met with who venture to appear with their faces as nature made them; but those who permit themselves this license are considered as women of bad reputation, and they never fail to hide themselves when they catch sight of an agent of the police.

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Thibet, so poor in agricultural and manufactured productions, is rich in metals; and gold and silver are so easily obtained that the humblest shepherds are acquainted with the art of purifying the precious metals. They may be sometimes seen at the bottom of the ravines, or in the fissures of the mountains, crouching over a fire of goat's dung, purifying in crucibles the gold dust gathered while leading their flocks to pasture. The result of this abundance of metals is that specie is of little value, and in consequence all commodities remain at a high price. The currency of the Thibetans consists of silver only: the pieces are a little larger but not so thick as a franc piece. On one side they bear an inscription in Thibetan, Parsee, or other Indian characters; on the reverse a crown of eight small round flowers. For the convenience of commerce, these pieces of silver are broken, and the number of flowers remaining on the fragment determines the value.

The whole piece is called *Tchan-Ka*. The *Tché-Pché* is one half, and consequently has only four flowers; the *Cho-Kan* has five, and the *Kogan* three.

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In seeing the number of those who sought from us instruction in our holy religion daily increase, we felt our courage rise; but it was to us a never-failing subject of grief, that we could not offer the Thibetans the glorious spectacle of the gorgeous and touching festivals of the Catholic church. It seemed to us that the beauty of the Catholic ceremonies must act powerfully on a people so fond of all that relates to external worship. The Thibetans, as we have before said, are eminently religious. There exists at Lha-Ssa a touching custom, which we were in some sort jealous of finding among infidels. In the evening, as soon as

the light declines, the Thibetan men, women, and children cease from all business, and assemble in the principal parts of the city, and in the public squares. As soon as the groups are formed, every one sits down on the ground, and begins slowly to chant his prayers in an under tone, and the religious concert produces an immense and solemn harmony throughout the city, powerfully affecting to the soul!

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The prayer chanted in these evening meetings varies according to the season of the year: that which they recite to the rosary is always the same, and is only composed of six syllables—*Om mani, padmé houm*. This formula, called briefly the *mani*, is not only heard from every mouth, but is every where written in the streets, in the interior of the houses, on every flag and streamer floating over the buildings, printed in the Landza, Tartar, and Thibetan characters. Certain rich and zealous Buddhists even entertain, at their own expense, companies of Lamas for the propagation of the *mani*; and these strange missionaries, chisel and hammer in hand, traverse field, mountain, and desert, to engrave the sacred formula on the stones and rocks they encounter in their path.

According to the celebrated Orientalist Klaproth, *Om mani, padmé houm*, is nothing but a Thibetan transcription of a Sanscrit formula introduced into Thibet from India, and which has, in that language, a complete and indubitable sense not to be found in the idiom of Thibet. *Om* is with the Hindus the mystic name of the divinity, with which all prayers commence, His mystic particle is also equivalent to the interjection Oh, and expresses a profound religious conviction; it is, in some sort, the formula of an act of faith. *Mani* signifies jewel precious thing; *padma*, the lotus (*padmé* is the vocative case of that word); *houm*, is equivalent to our Amen. The literal sense of this phrase is then:—

Om mani padmé houm!
O the jewel in the lotus! Amen!

The Lamas assert that the doctrine contained in these marvellous words is immense, and that the whole

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life of man is insufficient to measure its depth and extent.

Men who recite very often and very devoutly, *Om mani, &c.* avoid falling after death into any other of the six classes, and are immediately absorbed in the soul of Buddha. The jewel being the emblem of perfection, and the lotus that of Buddha, these words may perhaps be taken to express the desire of acquiring perfection, in order to be reunited to Buddha; and the symbolic formula, "*O the jewel in the lotus! Amen,*" may be paraphrased, "*O that I may attain perfection, and be absorbed in Buddha! Amen.*"

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The Chinese say that the three great productions of the capital of Thibet are Lamas, women, and dogs.

The cause of this multitude is the use the Thibetans make of dogs in the disposal of their dead. Four different kinds of sepulture are in use;—combustion; immersion in the rivers and lakes; exposure on the summits of mountains; and the fourth, the most esteemed, is to cut the corpse in pieces, and give it to the dogs.

The poor have the dogs of the suburbs for their manesoleum; but for persons of distinction a little more ceremony is used. There are convents where they keep, *ad hoc*, sacred dogs; and it is to them the bodies of the rich Thibetans are carried.

PERSONAL NARRATIVE

OF

TRAVELS

TO THE

EQUINOCTIAL REGIONS
OF AMERICA,

DURING THE YEARS 1799-1804.

BY ALEXANDER VON HUMBOLDT AND AIMÉ BONPLAND.

WRITTEN IN FRENCH BY

ALEXANDER VON HUMBOLDT:

TRANSLATED AND EDITED BY THOMASINA ROSS.

IN THREE VOLUMES.

VOL. II.

LONDON:

HENRY G. BOHN, YORK STREET, COVENT GARDEN.

1852.

the walls of the Mexican palace of Mitla, and the vases of ancient Greece.

We could not acquire any precise idea of the period to which the origin of the *mapires* and the painted vases, contained in the bone-cavern of Atarupe, can be traced. The greater part seemed not to be more than a century old; but it may be supposed that, sheltered from all humidity under the influence of a uniform temperature, the preservation of these articles would be no less perfect if their origin dated from a period far more remote. A tradition circulates among the Guahibos, that the warlike Atures, pursued by the Caribs, escaped to the rocks that rise in the middle of the Great Cataracts; and there that nation, heretofore so numerous, became gradually extinct, as well as its language.

The last families of the Atures still existed in 1767, in the time of the missionary Gili. At the period of our voyage an old parrot was shown at Maypures, of which the inhabitants said, and the fact is worthy of observation, that "they did not understand what it said, because it spoke the language of the Atures."

We opened, to the great concern of our guides, several *mapires*, for the purpose of examining attentively the form of the skulls. They were all marked by the characteristics of the American race, with the exception of two or three, which approached indubitably to the Caucasian. In the middle of the Cataracts, in the most inaccessible spots, cases are found strengthened with iron bands, and filled with European tools, vestiges of clothes, and glass trinkets. These articles, which have given rise to the most absurd reports of treasures hidden by the Jesuits, probably belonged to Portuguese traders who had penetrated into these savage countries. May we suppose that the skulls of European race, which we saw mingled with the skeletons of the natives, and preserved with the same care, were the remains of some Portuguese travellers who had died of sickness, or had been killed in battle? The aversion evinced by the natives for whatever is not of their own race renders this hypothesis little probable. Perhaps fugitive mestizos of the missions of the Meta and Apure may have come and settled near the Cataracts, marrying

women of the tribe of the Atures. Such mixed marriages sometimes take place in this zone, though they are more rare than in Canada, and in the whole of North America, where hunters of European origin unite themselves with savages, assume their habits, and sometimes acquire great political influence.

We took several skulls, the skeleton of a child of six or seven years old, and two of full-grown men of the nation of the Atures, from the cavern of Atarupe. All these bones, partly painted red, partly varnished with odoriferous resins, were placed in the baskets (*mapires* or *canastos*) which we have just described. They made almost the whole load of a mule; and as we knew the superstitious feelings of the Indians in reference to the remains of the dead after burial, we carefully enveloped the *canastos* in mats recently woven. Unfortunately for us, the penetration of the Indians, and the extreme quickness of their sense of smelling, rendered all our precautions useless. Wherever we stopped, in the missions of the Caribbees, amid the Llanos, between Angostura and Nueva Barcelona, the natives assembled round our mules to admire the monkeys which we had purchased at the Oinoco. These good people had scarcely touched our baggage, when they announced the approaching death of the beast of burden "that carried the dead." In vain we told them that they were deceived in their conjectures; and that the baskets contained the bones of crocodiles and manatis; they persisted in repeating that they smelt the resin that surrounded the skeletons, and "that they were their *old relations*." We were obliged to request that the monks would interpose their authority, to overcome the aversion of the natives, and procure for us a change of mules.

One of the skulls, which we took from the cavern of Atarupe, has appeared in the fine work published by my old master, Blumenbach, on the varieties of the human species. The skeletons of the Indians were lost on the coast of Africa, together with a considerable part of our collections, in a shipwreck, in which perished our friend and fellow-traveller, Fray Juan Gonzales, the young monk of the order of Saint Francis.

MANNERS AND CUSTOMS

OF

SEVERAL INDIAN TRIBES

LOCATED WEST OF THE MISSISSIPPI;

INCLUDING SOME ACCOUNT OF THE SOIL, CLIMATE, AND VEGETABLE
PRODUCTIONS, AND THE INDIAN MATERIA MEDICA: TO WHICH IS
PREFIXED THE HISTORY OF THE AUTHOR'S LIFE DURING A RESI-
DENCE OF SEVERAL YEARS AMONG THEM.

Dunn
BY JOHN B. HUNTER.

PHILADELPHIA:
PRINTED AND PUBLISHED FOR THE AUTHOR,
BY J. MAXWELL,
N. E. CORNER OF FOURTH AND WALNUT STREETS.
1828.

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CHAPTER III.

*Brief remarks on some of the Animals, Plants, and
Minerals indigenous to this district of country.*

My observations on these subjects must be very vague and limited; because I do not possess the competent knowledge to treat them otherwise; and because, a very full account, even if I did, would not comport with the plan I have proposed to follow in the publication of this work.

Animals.—I have seen two species of the American panther, or Cougar, (Felis.) The largest and most formidable inhabits the west and mountainous regions. It grows to the height of three feet, with a body about six feet long exclusive of the tail, which is full two and a half feet in length. Its colour is a dark brown, deepening on the back, and almost white on the belly.

The other is found in the woods bordering on the prairies, is about the length of the former, but not so high, and more slender; its colour partakes of the tawney; it is far less ferocious, and preys on the buffalo, elk, and deer.

The Wild cat, (Catus ferus of Lin.) is also numerous; it is similar to those found in the western states, and requires no description.

The buffalo, or more properly the bison, varies in height from five to five and a half feet. It differs from

Natural Productions, &c.

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the domesticated ox in being longer legged, shorter bodied, in having a large hump upon its back, a long mane, and much long hair on its head, back, and shoulders. Its greatest girth is just back of the fore legs, from which the body gradually tapers, and also diminishes in height. Its neck is long, and slender, head and eyes small, structure calculated for speed, and its general aspect fierce and terrible; though, except when wounded, or closely pressed, it is harmless and timid. Its smell is acute, and it chiefly depends on this sense for its safety. It may be denominated an annually migrating animal; though a few of them may be found far north, at all seasons of the year.

They go in immense herds, and no one, ignorant of the extent of the fertile prairies, can form any idea of the countless myriads that are spread over, and find support on them. The males and females herd separately, except in the copulating season, which is in June and July, when their assemblage is tumultuously promiscuous. The bulls at this time contend for mastery: I have seen some hundreds of these engaged in fighting at the same time; their roar is deep and loud, and their conflicts really terrible. The cows bring forth in March or April; they are proverbially attached to their young and form at night a circular phalanx round them, with their horns outward, to protect them against the attack of the wolves.

MEMOIRS OF A CAPTIVITY AMONG THE INDIANS OF NORTH AMERICA.

FROM CHILDHOOD TO THE AGE OF NINETEEN:
WITH
ANECDOTES DESCRIPTIVE OF
THEIR MANNERS AND CUSTOMS.
TO WHICH IS ADDED,
SOME ACCOUNT OF THE
SOIL, CLIMATE, AND VEGETABLE PRODUCTIONS
OF THE TERRITORY WESTWARD OF THE MISSISSIPPI

BY JOHN D. HUNTER.

A NEW EDITION, WITH PORTRAIT.

LONDON:

PRINTED FOR
LONGMAN, HURST, REES, ORME, BROWN, AND GREEN,<
PATERNOSTER-BOW,
1823.



JOHN D. HUNTER.

London. Published by Longman & Co. July 1823.

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I journeyed nearly north, over a country which at first was level and partly composed of prairie-land, though afterwards it was somewhat hilly; and in the course of a few days struck upon the waters flowing, as I have since learned, into White River, at which I afterwards arrived, and gradually ascended in a northern direction till it became only a small stream.

The prairie-lands I passed over were covered with a very luxuriant grazing vegetation, and afforded subsistence for exceedingly numerous herds of buffalo, elk, and deer.

Rattlesnakes, both black and parti-coloured, were larger and more numerous than I had ever before seen; and they would infest the country, to a much greater extent, were it not for the hostility that exists between them and the deer.

This animal on discovering a snake, as I have repeatedly witnessed, retreats some distance from it, then running with great rapidity alights with its col-

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lected feet upon it; and repeats this manœuvre till it has destroyed its enemy.

The hunting season for furs had now gone by, and the time and labour necessary to procure food for myself was very inconsiderable. I knew of no human being near me; my only companions were the grazing herbs, the rapacious animals that preyed on them, the beaver and other animals that afforded pelts, and birds, fish, and reptiles. Notwithstanding this solitude, many sources of amusement presented themselves to me, especially after I had become somewhat familiarized to it. The country around was delightful, and I roved over it almost incessantly, in ardent expectation of falling in with some party of Indians, with whom I might be permitted to associate myself. Apart from the hunting that was essential to my subsistence, I practised various arts to take fish, birds, and small game, frequently bathed in the river, and took great pleasure in regarding the dispositions and habits of such animals as were presented to my observations.

The conflicts of the male buffalos and deer, the attack of the latter on the rattlesnake, the industry and ingenuity of the beaver in constructing its dam, &c., and the attacks of the panther on its prey, afforded much interest, and engrossed much time. Indeed, I have lain for half a day at a time in the shade to witness the management and policy observed by the ants in storing up their food, the manœuvres of the spider in taking its prey, the artifice of the mason-fly (Sphex) in constructing and storing its clayey cells, and the voraciousness and industry of the dragon-fly

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The prairies may be protected from fire by ploughing in the prairie grass to any length and width necessary to arrest its progress. In some situations where the streams interlock, large districts of country may, in this way, be defended against the fire, which in dry windy weather, spreads with a rapidity not always to be avoided by the caution and utmost speed of the buffalo.

In the fall of the year, when the prairie grass is dry, the prairies are sometimes set on fire by accident, and at others by design. Should the wind be high on these occasions, no spectacle can surpass them in grandeur and sublimity; a space as far as the eye can reach, is seen devastated by the igneous torrent. In some places

the tortuous flames, comparatively lost in distance, appear to smoulder beneath impervious columns of smoke; at others, they burst into the skies with the vividness and rapidity of lightning, and seem to threaten universal desolation. Their speed is that of the winds, and destruction betides every living thing that cannot outfly its course. The grazing herds, conscious of the threatening calamity, fearlessly congregate with their natural enemies; and the buffalos, elks, deer, panthers, wolves and bears, are seen promiscuously crowded together. They sometimes escape to the ravines and avoid death, but more frequently they are overwhelmed by the resistless flames. One of these fires raged to a very great extent a few years since, on the prairies between the Kansas and Arkansas rivers; and it is ex-

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remely painful on passing over them, to witness the ruin it produced. The mass of bleached bones strewed on the earth is astonishingly great; and no doubt remains, that many thousand buffalos and other animals perished at this particular period.

These fires do not in common prove so destructive; but their occasional prevalence contributes greatly to the destruction of animal life.

All the difficulties presented to the settlement of the prairies, as above stated, may be surmounted, wherever the fertility of the soil will compensate for cultivation.

Many of the swamps or morasses will admit of being drained; at least, such is my present impression; and they would, under such management, prove excellent for arable and grazing purposes.

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BRIEF REMARKS ON SOME OF THE ANIMALS, PLANTS, AND MINERALS, INDIGENOUS TO THIS DISTRICT OF COUNTRY.

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grass. They might, no doubt, be domesticated with great advantage, more especially as their hair is of a texture surpassing in fineness the wool of the Merino sheep. In their wild state it appears to great disadvantage, on account of its being generally interwoven with the burrs of various plants. This might be altogether obviated by grazing them on the smooth bottoms of the reclaimed meadows. Attempts have been made to cross them with the common cow, but a failure followed in consequence of their difference in structure.

AN
ACCOUNT
OF TWO
VOYAGES
TO
NEW-ENGLAND.

Wherein you have the setting out of a Ship, with the charges ; The prices of all necessaries for furnishing a Planter and his Family at his first coming ; A Description of the Countrey, Natives and Creatures, with their Merchandize and Physical use ; The Government of the Countrey as it is now possessed by the *English*, &c. A large Chronological Table of the most remarkable passages, from the first discovering of the Continent of *America*, to the year 1673.

By *John Josselyn* Gent.

Memner, distich rendred English by *Dr. Heylin*.

Heart, take thine ease,

Men hard to please

Thou haply might'st offend,

Though one speak ill

Of thee, some will

Say better ; there's an end.

London, Printed for *Giles Widdows*, at the *Green-Dragon* in *St. Paul's-Church-yard*. 1674.

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The plants in *New-England* for the variety, number, beauty, and virtues, may stand in Competition with the plants of any Countrey in Europe. *Johnson* hath added to *Gerard's Herbal* 300. and *Parkinson* mentioneth many more ; had they been in *New-England* they might have found 1000 at least never heard of nor seen by any *Englishman* before : 'Tis true, the Countrey hath no *Bonerets*, or *Tartarlambs*, no glittering coloured *Tulips* ; but here you have the *American Mary-Gold*, the *Earth-nut* bearing a princely Flower, the beautiful leaved *Pirola*, the honied *Colibry*, &c. They are generally of (somewhat) a more masculine virtue, than any of the same species in *England*, but not in so terrible a degree, as to be mischievous or ineffectual to our *English* bodies. It is affirm'd by some that no forraign Drugg or Simple can be so proper to *Englishmen* as their own, for the

quantity of *Opium* which *Turks* do safely take will kill four *Englishmen*, and that which will

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salve their wounds within a day, will not cure an *Englishman* in three. To which I answer that it is custom that brings the *Turks* to the familiar use of *Opium*. You may have heard of a *Taylor* in *Kent*, who being afflicted with want of sleep ventured upon *Opium*, taking at first a grain, and increasing of it till it came to an ounce, which quantitie he took as familiarly as a *Turk*, without any harm, more than that he could not sleep without it. The *English* in *New-England* take white *Hellebore*, which operates as fairly with them, as with the *Indians*, who sleeping of it in water sometime, give it to young lads gathered together a purpose to drink, if it come up they force them to drink again their vomit, (which they save in a *Birchen-dish*) till it staves with them, & he that gets the victory of it is made Captain of the other lads for that year. There is a plant likewise, called for want of a name *Clownes wound-wort* by the *English*, though it be not the same, that will heal a green wound in 24 hours, if a wise man have the ordering of it. Thus much for the general, I shall now begin to discover unto you the plants more particularly, and I shall first begin with *Trees*, and of them, first with such as are called in Scripture *Trees of God*, that is great

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Trees, that grow of themselves without planting. *Psal.* 104. 16, 17. *Satiantur arbores Jehova, cedri libani quas plantavit ; (ubi avicula nidificent) abietes domicilia ciconia.* The *Hérons* take great delight to sit basking upon the tops of these *Trees*. And I shall not be over large in any, having written of them in my Treatise of the rarities of *New-England*, to which I refer you.

The *Oake* I have given you an account of, and the kinds ; I shall add the ordering of *Red Oake* for *Wainscot*. When they have cut it down and clear'd it from the branches, they pitch the body of the Tree in a muddy place in a River, with the head downward for some time, afterwards they draw it out, and when it is seasoned sufficiently, they saw it into boards for *Wainscot*, and it will branch out into curious works.

There is an admirable rare Creature in shape like a *Buck*, with Horns, of a gummy substance, which I have often found in the fall of the leaf upon the ground amongst the withered leaves; a living Creature I cannot call it; having only the sign of a mouth and eyes: seldom or never shall you meet with any of them whole, but the head and horns, or the hinder parts, broken off from the rest; the *Indians* call them *Tree-Bucks*, and have a superstitious saying (for I believe

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they never see any of them living) that if they can see a *Tree-Buck* walking upon the branches of an *Oake* when they go out in a morning to hunt, they shall have good luck that day. What they are good for I know not, but certainly there is some more than ordinary virtue in them. It is true that nothing in nature is superfluous, and we have the Scripture to back it, that God created nothing in vain. The like Creatures they have at the *Barbadoes* which they call *Negroes* heads, found in the *Sands*, about two inches long, with forehead, eyes, nose, mouth, chin, and part of the neck, they are always found loose in the *Sands* without any root, it is as black as *Fet*, but whence it comes they know not. I have read likewise, that in the *Canaries* or *Fortunate-Islands*, there is found a certain Creature, which Boys bring home from the mountains as oft as they would, and named them *Tudelsquels*, or little *Germans*: for they were dry'd dead Carcases, almost three footed, which any boy did easily carry in one of the palms of his hand, and they were of an humaneshape; but the whole dead Carcase was clearly like unto *Parchment*, and their bones were flexible, as it were gristles: against the *Sun*, also, their *jewels* and intestines were seen. Surely (saith my Author) the destroyed race of the *Pigmies* was there. There is

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also many times found upon the leaves of the *Oake* a Creature like a *Frog*, being as thin as a leaf, and transparent, as yellow as *Gold*, with little fiery red eyes, the *English* call them *Tree-frogs* or *Tree-toads* (but of *Tree-toads* I shall have occasion to speak in another place) they are said to be venomous, but may be safely used, being admirable to stop womens over-flowing courses hung about their necks in a *Taffetic*

bag.

Captain Smith writes that in *New-England* there grows a certain berry called *Kermes*, worth 10 shillings a pound, and had been formerly sold for 30 or 40 shillings a pound, which may yearly be gathered in good quantity. I have sought for this berry, he speaks of, as a man should seek for a needle in a bottle of Hay, but could never light upon it; unless that kind of *Solomon seal* called by the *English* *Treacle-berry* be it. Gerard our famous Herbalist writes that they grow upon a little Tree called *Scarlet-Oake*, the leaves have one sharp prickle at the end of it; it beareth small *Acorns*: But the grain or berry grows out of the woody branches, like an excrescence of the substance of the *Oake-Apple*, and of the bigness of *Pease*, at first white, when ripe of an *Ash-colour*, which ingenders little *Maggots*, which when it begins

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to have wings are put into a bag and bouted up and down till dead, and then made up into lumps, the Maggot as most do deem is *Cutchenele*; So that *Chermes* is *Cutchenele*: the berries dye *scarlet*. Mr. George Sands in his Travels saith (much to the same purpose) that *scarlet dye* grows like a blister on the leaf of the *Holy Oake*, a little shrub, yet producing *Acorns*, being gathered they rub out of it a certain red dust, that converteth after a while into worms, which they kill with *Wine*, when they begin to quicken. See farther concerning *Treacle-berries* and *Cutchenele* in the rarities of *New-England*.

The *Pine-Tree* challengeth the next place, and that sort which is called *Board-pine* is the principal, it is a stately large Tree, very tall, and sometimes two or three fadom about: of the body the *English* make large *Canons* of 20 foot long, and two foot and a half over, hollowing of them with an *Adds*, and shaping of the outside like a *Boat*. Some conceive that the wood called *Gopher* in Scripture, of which *Noah* made the *Ark*, was no other than *Pine*, *Gen. 6. 14*. The bark thereof is good for *Ulcers* in tender persons that refuse sharp medicines. The inner bark of young *board-pine* cut small and stamp'd and boiled in a Gallon of water is a very sovereign medicine for burn

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or scald, washing the sore with some of

the decoction, and then laying on the bark stamp very soft: or for frozen limbs, to take out the fire and to heal them, take the bark of Board-pine-Tree, cut it small and stamp it and boil it in a gallon of water to Gelly, wash the sore with the liquor, stamp the bark again till it be very soft and bind it on. The Turpentine is excellent to heal wounds and cuts, and hath all the properties of *Venice Turpentine*, the *Rosen* is as good as *Frankincense*; and the powder of the dried leaves generateth flesh; the distilled water of the green Cones taketh away wrinkles in the face being laid on with Cloths.

The Fir-tree is a large Tree too, but seldom so big as the Pine, the bark is smooth, with knobs or blisters, in which lyeth clear liquid Turpentine very good to be put into salves and ointments, the leaves or Cones boiled in Beer are good for the Scurvie, the young buds are excellent to put into Epithemes for Warts and Corns, the *Rosen* is altogether as good as *Frankincense*; out of this Tree the Poleakers draw Pitch and Tarr; the manner I shall give you, for that it may (with many other things contained in this Treatise) be beneficial to my Countrymen, either there already seated, or that

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may happen to go thither hereafter. Out of the fattest wood changed into Torchwood, which is a disease in that Tree they draw Tarr, first a place must be paved with stone or the like, a little higher in the middle, about which there must be made gutters, into which the liquor falls, then out from them other gutters are to be drawn, by which it may be received, then is it put into barrels. The place thus prepared, the cloven wood must be set upright, then must it be covered with a great number of fir and pitch bowes; and on every part all about with much lome and fods of earth, and great heed must be taken, lest there be any cleft or chink remaining, only a hole left in the top of the furnace, through which the fire may be put in, and the flame and smoak to pass out: when the fire burneth, the Pitch or Tarr runneth forth first thin, and then thicker; of which when it is boiled is made Pitch: the powder of dried Pitch is used to generate flesh in wounds and sores. The knots of this Tree

and fat-pine are used by the *English* instead of Candles, and it will burn a long time, but it makes the people pale.

The Spruce-tree I have given you an account of in my *New-England rarities*. In the North-east of *Scotland* upon the banks

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of *Lough-argick*, there hath been formerly of these Trees 28 handful about at the Root, and their bodies mounted to 90 foot of height, bearing at the length 20 inches diameter. At *Pascataway* there is now a Spruce-tree brought down to the water-side by our Mass-men of an incredible bigness, and so long that no Skipper durst ever yet adventure to ship it, but there it lyes and Rots.

The Hemlock-tree is a kind of spruce or pine; the bark boiled and stamped till it be very soft is excellent for to heal wounds, and so is the Turpentine thereof, and the Turpentine that issueth from the Cones of the Larch-tree, (which comes nearest of any to the right Turpentine) is singularly good to heal wounds, and to draw out the malice (or Thorn, as *Helmont* phrases is) of any Ach, rubbing the place therewith, and strowing upon it the powder of *Sage-leaves*.

The white Cedar is a stately Tree, and is taken by some to be *Tamarisk*, this Tree the *English* saw into boards to floor their Rooms, for which purpose it is excellent, long lasting, and wears very smooth and white; likewise they make shingles to cover their houses with instead of tyle, it will never warp. This Tree, the Oak and the

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Larch-tree are best for building. Groundsels made of Larch-tree will never rot, and the longer it lyes the harder it growes, that you may almost drive a nail into a bar of Iron as easily as into that. Oh, that my Countrymen might obtain that blessing with their buildings, which *Esay* prophesied to the *Jewes* in the 65 Chapter and 22 verse. *Non edificabunt & alius inhabitabit, non plantabunt & alius comedet: sed ut sunt dies Arborum, dies erunt populi mei, & opus manuum suarum deterent electi mei.*

The Sassafras-tree is no great Tree, I have met with some as big as my middle, the rind is tawny and upon that a thin co-

four of Ashes, the inner part is white, of an excellent smell like Fennel, of a sweet tast with some bitterness; the leaves are like Fig-leaves of a dark green. A decoction of the Roots and bark thereof sweetned with Sugar, and drunk in the morning fasting will open the body and procure a stool or two, it is good for the Scurvie taken some time together, and laying upon the legs the green leaves of white *Hellebore*. They give it to Cows that have newly calved to make them cast their Cleanings. This Tree growes not beyond *Black-point* Eastward: it is observed, that there is no province but produces Trees and plants not growing in other Regions.

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Non omnis fert omnia tellus.

The Walnut which is divers, some bearing square nuts, others like ours, but smaller: there is likewise black Walnut of precious use for Tables, Cabinets and the like. The Walnut-tree is the toughest wood in the Countrey, and therefore made use of for Hoops and Bowes, there being no Yew there growing; In *England* they made their Bowes usually of Witch, Hazel, Ash, Yew, the best of outlandish Elm, but the *Indians* make theirs of Walnut.

The Line-tree with long nuts, the other kind I could never find: the wood of this Tree, Laurel, Rhamnus, Holly and Ivy are accounted for woods that cause fire by attrition; Laurel and Ivy are not growing in *New-England*: the *Indians* will rub two sear'd sticks of any sort of wood, and kindle a fire with them presently.

The Maple-tree, on the boughs of this Tree I have often found a jellied substance like *Jewes-Ears*, which I found upon tryal to be as good for sore throats &c.

The Birch-tree is of two kinds, ordinary Birch, and black Birch, many of these Trees are stript of their bark by the *Indians*, who make of it their Canows, Kettles,

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and Birchen-dishes: there is an excrescence growing out of the body of the Tree called Spunk, or dead mens Caps, it growes at the Roots of Ash, or Beech, or Elm; but the best is that which growes upon the black Birch, this boiled and beaten, and then dri-

ed in an Oven maketh excellent Touch-wood, and Balls to play with.

Alder, of which wood there is abundance in the wet swamps: the bark thereof with the yolke of an Egg is good for a strain; an *Indian* bruising of his knee, chew'd the bark of Alder fasting and laid it to, which quickly helped him. The wives of our West-Countrey English make a drink with the seeds of Alder, giving it to their Children troubled with the *Albes*. I have talk'd with many of them, but could never apprehend what disease it should be they so name, these Trees are called by some Sul-linges.

The *Indians* tell of a Tree that growes far up in the land, that is as big as an Oake, that will cure the falling-sickness infallibly; what part thereof they use, Bark, Wood, leaves or fruit, I could never learn; they promised often to bring of it to me, but did not. I have seen a stately Tree growing here and there in vallies, not like to any Trees in Europe, having a smooth bark of

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a dark brown colour, the leaves like great Maple, in *England* called Sycamor, but larger, it may be this, is the Tree they brag of.

Thus much concerning Trees, now I shall present to your view the Shrubs; and first of the Sumach Shrub, which as I have told you in *New-Englands* rarities, differeth from all the kinds set down in our *English* Herbals; the root dyeth wool of cloth reddish, the decoction of the leaves in wine drunk, is good for all Fluxes of the belly in man or woman, the whites, &c. For galled places stamp the leaves with honey, and apply it, nothing so soon healeth a wound in the head as Sumach stamp and applyed once in three dayes, the powder strewed in stayeth the bleeding of wounds: The seed of Sumach pounded and mixt with honey, healeth the Hemorrhoids, the gum put into a hollow tooth asswageth the pain, the bark or berries in the fall of the leaf, is as good as galls to make Ink of.

Elder in *New-England* is shrubbie, & dies once in two years: there is a sort of dwarf-Elder that growes by the Sea-side that hath a red pith, the berries of both are smaller than *English*-Elder, not round but corner'd, neither of them smell so strong as ours.

Juniper growes for the most part by the

Sea-side, it bears abundance of skie-colour-

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red berries sed upon by Partridges, and hath a woodie root, which induceth me to believe that the plant mention'd in Job 30. 4. *Qui decerpebant herbas è sulfilagine cum stirpibus: etiam radices Juniperorum cibo erant illis*, was our Indian plant *Cassava*. They write that *Juniper*-coals preserve fire longest of any, keeping fire a whole year without supply, yet the *Indian* never burns of it.

Sweet fern, see the rarities of *New England*, the tops and nucamens of sweet fern boiled in water or milk and drunk helpeth all manner of Fluxes, being boiled in water it makes an excellent liquor for Inck.

Current-bulthes are of two kinds red and black, the black currents which are larger than the red smell like cats piss, yet are reasonable pleatant in eating.

The Gooseberry-bush, the berry of which is called Grosers or thorn Grapes, grow all over the Countrie, the berry is but small, of a red or purple colour when ripe.

There is a small shrub which is very common, growing sometimes to the height of Elder, bearing a berry like in shape to the fruit of the white thorn, of a pale yellow colour at first, then red, when it is ripe of a deep purple, of a delicate Aromatical tast, somewhat stickie: to conclude, al-

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wayes observe this rule in taking or refusing unknown fruit: if you find them eaten of the fowl or beast, you may boldly venture to eat of them, otherwise do not touch them.

Maze, otherwise called *Turkie-wheat*, or rather *Indian-wheat*, because it came first from thence; the leaves boiled and drunk helpeth pain in the back; of the stalkes when they are green you may make *Beverage*, as they do with *Calamels*, or *Sugarcanes*. The raw Corn chewed ripens felons or Cats hairs, or you may lay Samp to it: The *Indians* before it be thorow ripe eat of it parched. Certainly the parched Corn that *Abigail* brought to *David* was of this kind of grain, 1 S.m. 25. 18. The *Jewes* manner was (as it is delivered to us by a learned *Divine*) first to parch their Corn, then they fryed it, and lastly they boiled it to a paste,

and then tempered it with water, *Cheese-Curds*, *Honey* and *Eggs*, this they carried drye with them to the Camp, and so wet the Cakes in Wine or milk; such was the pulse too of *Africa*.

French-beans, or rather *American-beans*, the Herbalists call them kidney beans from their shape and effects, for they strengthen the kidneys; they are variegated much, some being bigger a great deal than others; some

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white, black, red, yellow, blew, spotted; besides your *Bonivis* and *Calavances* and the kidney-bean, that is proper to *Ronoake*, but these are brought into the Countrie, the other are natural to the climate. So the *Mexico* pompion which is flat and deeply camphered, the flesh laid to, asswageth pain of the eyes. The water-mellon is proper to the Countrie, the flesh of it is of a flesh colour, a rare cooler of Feavers, and excellent against the stone. *Pomum spinosum* and *palma Christi* too growes not here, unless planted, brought from *Peru*; the latter is thought to be the plant, that shided *Jonah the Prophet*, *Jonas* 4. 6. *Paraverat enim Jehova Deus ricinum qui ascenderet supra Jonam, ut esset umbra super caput ejus ereptura eum à malo ipsius; letabiturque Jonas de ricino illo letitia magna*. *Ricinum*, that is *palma Christi*, called also *cucurbita*, and therefore translated a Gourd.

Tobacco, or *Tabacca* so called from *Tabaco* or *Tabago*, one of the *Caribbe-Islands* about 50 *English* miles from *Trinidad*. The right name, according to *Monardus*, is *picielte*, as others will *petum*, *nicotian* from *Nicot*, a *Portingal*, to whom it was presented for a raritie in *Anno Dom.* 1559. by one that brought it from *Florida*. Great contest there is about the time when it was first

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brought into *England*, some will have *Sir John Hawkins* the first, others *Sir Francis Drake's* Mariners; others again say that one *Mr. Lane* imployed by *Sir Walter Raleigh* brought it first into *England*; all conclude that *Sir Walter Raleigh* brought it first in use. It is observed that no one kind of forraign Commodity yieldeib greater advantage to the publick than *Tobacco*, it is generally made the complement of our entertainment, and hath made more slaves than *Maho-*

met. There is three sorts of it Marchantable, the first horse Tobacco, having a broad long leaf piked at the end; the second round pointed Tobacco; third sweet scented Tobacco. These are made up into Cane, leaf or ball; there is little of it p'anted in *New-England*, neither have they learned the right way of curing of it. It is sown in *April* upon a bed of rich mould sifted, they make a bed about three yards long, or more according to the ground they intend to plant, and a yard and a half over; this they tread down hard, then they sow their seed upon it as thick as may be, and sift fine earth upon it, then tread it down again as hard as possible they can, when it hath gotten four or six leaves, they remove it into the planting ground; when it begins to bud towards flowering, they crop off the

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top, for the Flower drawes away the strength of the leaf. For the rest I refer you to the Planter, being not willing to discover their mysteries. The *Indians* in *New-England* use a small round leaved Tobacco, called by them, or the Fishermen Poke. It is odious to the English. The virtues of Tobacco are these, it helps digestion, the Gout, the Tooth-ach, prevents infection by scents, it heats the cold, and cools them that sweat, feedeth the hungry, spent spirits restoreth, purgeth the stomach, killeth nits and lice, the juice of the green leaf healeth green wounds although poisoned, the Syrup for many diseases, the smoak for the Phibisick, cough of the lungs, distillations of Rheume, and all diseases of a cold and moist cause, good for all bodies cold and moist taken upon an empty stomach, taken upon a full stomach it precipitates digestion, immoderately taken it dryeth the body, enflameth the blood, burts the brain, weakens the eyes and the sinews.

White Hellebore is used for the Scurvie by the English. A friend of mine gave them first a purge, then conserve of Bearberries, then fumed their leggs with vinegar, sprinkled upon a piece of mill-stone made hot, and applied to the sores white Hellebore leaves; drink made of Orpine and sorrel were given likewise with it, and Sa-

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Scurvie-grafs. To kill lice, boil the roots of Hellebore in milk, and anoint the hair of the

head therewith or other places.

Mandrake, is a very rare plant, the *Indians* know it not, it is found in the woods about *Pascataway*, they do in plain terms stink, therefore *Reubens-Flowers* that he brought home were not Mandrakes, Gen. 30. 14, 15, 16. They are rendered in the Latine *Amabiles flores*, the same word say our *Divines* is used in Canticles, 7. 4. *Amabiles istos flores edentes odorem, &c. secundum ossia nostra omnes pretiosos fructus, recentes simulac veteres, dilecte mi, repono tibi.* So that the right translation is, *Reuben brought home amiable and sweet smelling Flowers; this in the Canticles (say they) expounding the other.*

Calamus Aromaticus, or the sweet smelling reed, it Flowers in July; see *New-Englands rarities*.

Sarsaparilla or roughbind-weed (as some describe it) the leaves and whole bind set with thorns, of this there is store growing upon the banks of Ponds. See the rarities of *New-England*. The leaves of the *Sarsaparilla* there described pounded with Hogs grease and boiled to an unguent, is excellent in the curing of wounds.

Live for ever, it is a kind of *Cud-weed*,

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flourisheth all summer long till cold weather comes in, it growes now plentifully in our *English Gardens*, it is good for cough of the lungs, and to cleanse the breast taken as you do Tobacco; and for pain in the head the decoction, or the juice strained and drunk in Bear, Wine, or *Aqua vitæ*, killeth worms. The Fishermen when they want Tobacco take this herb being cut and dried.

Lysimachus or Loose-strife: there are several kinds, but the most noted is the yellow *Lysimachus* of *Virginia*, the root is longish and white, as thick as ones thumb, the stalkes of an overworn colour, and a little hairie, the middle vein of the leaf whitish, the Flower yellow and like *Primroses*, and therefore called *Tree-primrose*, growes upon seedie vessels, &c. The first year it growes not up to a stalke, but sends up many large leaves handsomely lying one upon another, Rose fashion, Flowers in June, the seed is ripe in August, this as I have said is taken by the English for Scabious.

St. John's wort, it preserveth Cheese made up in it, at Sea.

Spurge or Wolfes milch there are several sorts.

Avens, or herb-bennet; you have an account of it in *New-Englands rarities*; but one

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thing more I shall add, that you may plainly perceive a more masculine quality in the plants growing in *New-England*. A neighbour of mine in Hay-time, having overheated himself, and melted his grease, with striving to outmowe another man, fell dangerously sick, not being able to turn himself in his bed, his stomach gon, and his heart fainting ever and anon; to whom I administered the decoction of *Avens*-Roots and leaves in water and wine, sweetning it with Syrup of Clove-Gilliflowers, in one weeks time it recovered him, so that he was able to perform his daily work, being a poor planter or husbandman as we call them.

Red-Lilly growes all over the Countrey amongst the bushes. Mr. Johnson upon Gerard takes the Tulip to be the Lilly of the field mentioned by our Saviour, Matth. 6. 28, 29. *Ac de vestitu quid solliciti estis? discite quomodo lilia agrorum augeantur: non fatigantur, neque nent, sed dico vobis, ne Solomonem quidem cum universa gloria sic amicum fuisse ut unum ex istis.* Solomon in all his Royalty was not like one of them. His reasons are, first from the shape, like a lilly; The second, because those places where our Saviour was conversant they grow wild in the fields. Third, the infinite variety of the co-

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lours. The fourth and last reason, the wondrous beautie and mixture of these Flowers.

Water-lillies; the black roots dried and pulverized, are wondrous effectual in the stopping of all manner of fluxes of the belly, drunk with wine or water.

Herba-paris, one berry, herb true love, or four-leaved night-shade, the leaves are good to be laid upon hot tumours.

Umbilicus veneris, or *New-England daisie*, it is good for hot humours, *Erisipelas*, St. Antonie's fire, all inflammations.

Glass-wort, a little quantity of this plant you may take for the Dropsie, but be very careful that you take not too much, for it worketh impetuously.

Water-plantane, called in *New-England* water Suck-leaves, and Scurvie-leaves, you must lay them whole to the leggs to draw out water between the skin and the flesh.

Rosa-solin, Sun-dew, moor-grass, this plant I have seen more of, than ever I saw in my whole life before in *England*, a man may gather upon some marish-grounds an incredible quantity in a short time; towards the middle of June it is in its season, for then its spear is shot out to its length, of which they take hold and pull the whole plant up by the roots from the moss with

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Amber-greese I take to be a Mushroom; see the rarities of *New-England*. Monardus writeth that *Amber-greese* riseth out of a certain clammy and bituminous earth under the Seas, and by the Sea-side, the billows casting up part of it a land, and fish devour the rest. Some say it is the seed of a Whale, others, that it springeth from fountains as pitch doth, which fishes swallow down; the air congealeth it. And sometimes it is found in the crevices and corners of Rocks.

Fuss-balls, *Multipuffs* called by the Fishermen *Wolves-farts*, are to be found plentifully, and those bigger by much than any I have seen in *England*.

Coraline there is infinite store of it cast upon the shore, and another plant that is more spinie, of a Red colour, and as hard as Corral. *Coraline* laid to the gout caseth the pain.

Sea-Oake or wreath, or Sea-weed, the black pouches of Oar-weed dried and pulverized, and drunk with White-wine, is an excellent remedy for the stone.

I will finish this part of my relation concerning plants, with an admirable plant for the curing and taking away of Corns, which many times sore troubleth the Traveller: it is not above a handfull high; the little branches are woodie, the leaves like

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the leaves of Box, but broader and much thicker, hard, and of a deep grass-green colour; this bruised or champt in the mouth and laid upon the Corn will take it away clean in one night. And observe all *Indian* Trees and plants, their Roots are but of small depth, and so they must be set.

Of Beasts of the earth there be scarce 120 several kinds, and not much more of the Fowls of the Air, is the opinion of some Naturalists; there are not many kinds of Beasts in New-England, they may be divided into Beasts of the Chase of the stinking foot, as *Roes*, *Foxes*, *Jaccals*, *Wolves*, *Wild-cats*, *Raccons*, *Porcupines*, *Squunks*, *Musquashes*, *Squirrels*, *Sables*, and *Mattises*; and Beasts of the Chase of the sweet foot, *Buck*, *Red Deer*, *Rain-Deer*, *Elke*, *Marouse*, *Maccarib*, *Beaver*, *Otter*, *Marten*, *Hare*.

The *Roe* a kind of Deer, and the fleetest Beast upon earth is here to be found, and is good verison, but not over fat.

The *Fox*, the male is called a dog-fox, the female a bitch-fox, they go a clicketing the beginning of the spring, and bring forth their Cubs in May and June. There are two or three kinds of them; one a great yellow Fox, another grey, who will climb up into Trees; the black Fox is of much esteem. *Foxes* and *Wolves* are usually hunted

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in England from Holy-Rood day, till the *Annunciation*. In New-England they make best sport in the depth of winter: they lay a sledg-load of Cods-heads on the other side of a paled fence when the moon shines, and about nine or ten of the clock the *Foxes* come to it, sometimes two or three, or half a dozen, and more; these they shoot, and by that time they have cased them, there will be as many; So they continue shooting and killing of *Foxes* as long as the moon shineth: I have known half a score kill'd in one night. Their pisses are bonie like a doggs, their fat liquified and put into the ears caseth the pain, their tails or bushes are very fair ones and of good use, but their skins are so thin (yet thick fet with deep furr) that they will hardly hold the dressing.

Jaccals there be abundance, which is a Creature much like a Fox, but smaller, they are very frequent in *Palestina*, or the *Holy-land*.

The *Wolf* seeketh his mate and goes a clicketing at the same season with *Foxes*, and bring forth their whelps as they do, but their kennels are under thick bushes by great Trees in remote places by the swamps, he is to be hunted as the Fox from Holy-rood day till the *Annunciation*.

The *Musquashes* is a small Beast that lives in shallow ponds, where they build them houses of earth and sticks in shape like mole-hills, and feed upon *Calamus Aromaticus*; in May they scent very strong of Muske; their furr is of no great esteem; their stones wrapt up in Cotten-wool will continue a long time, and are good to lay amongst cloths to give them a grateful smell.

The *Squirrel*, of which there are three sorts, the mouse-squirrel, the gray squirrel, and the flying squirrel, called by the *Indian Assapanick*. The mouse-squirrel is hardly so big as a Rat, streak'd on both sides with black and red streaks, they are mischievous vermine destroying abundance of Corn both in the field and in the house, where they will gnaw holes into Chests, and tear clothes both linnen and wollen, and are notable nut-gatherers in August; when hase and filbert nuts are ripe you may see upon every Nut-tree as many mouse-squirrels as leaves; So that the nuts are gone in a trice, which they convey to their Drays or Nests. The gray squirrel is pretty large, almost as big as a Conje, and are very good meat: in some parts of the Countrie there are many of them. The flying squirrel is so called, be-

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cause (his skin being loose and large) he spreads it on both sides like wings when he passeth from one Tree to another at great distance. I cannot call it flying nor leaping, for it is both.

The *Mattise* is a Creature whose head and fore parts is shaped somewhat like a Lyons, not altogether so big as a house-cat, they are innumerable up in the Countrey, and are esteemed good furr.

The *Sable* is much of the size of a *Mattise* perfect black, but what store there is of them I cannot tell, I never saw but two of them in Eight years space.

The *Martin* is as ours are in England, but blacker, they breed in holes which they make in the earth like Conies, and are innumerable, their skins or furr are in much request.

The *Buck*, *Stag*, and *Rain-Deer* are Creatures that will live in the coldest climates, here they are innumerable, bringing forth three *Fawns* or *Calves* at a time, which

they hide a mile asunder to prevent their destruction by the *Wolves*, wild-*Cats*, *Bears*, and *Mequans* : when they are in season they will be very fat : there are but few slain by the *English*. The *Indians* who shoot them, and take of them with toyls, bring them in

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But there are a Generation of men and women in this prophane age that despise Gods learning and his Ushers to the *Athenians*, choosing to wallow in the pleasures of sin for a season. I shall conclude this excursion, with that which a Poet writ sometime since, and then return to the trimming of my *Owl*.

*Say thou pour'st them Wheat,
And they would Acorns eat ;
'Twere simple fury in thee then to wast
Thy self, on them that have no tast ;
No, give them draff their fill,
Husks, Grains and swill ;
They that love Lees and leave the lustie Wine,
Envy them not, their palats with the Swine.*

The *Raven* is here numerous and *Crowes*, but *Rooks*, *Danes*, *Popinjaes*, *Megpies* there be none. It is observed that the female of all Birds of prey and *Ravin* is ever bigger than the male, more venturous, hardy, and watchful : but such Birds as do not live by prey and *Ravin*, the male is more large than the female. So much for Birds of prey, the next are Birds for the dish, and the first of these is,

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The *Turkie*, which is in *New-England* a very large Bird, they breed twice or thrice in a year, if you would preserve the young Chickens alive, you must give them no water, for if they come to have their fill of water they will drop away strangely, and you will never be able to rear any of them: they are excellent meat, especially a *Turkie-Capon* beyond that, for which Eight shillings was given, their Eggs are very wholesome and restore decayed nature exceedingly. But the *French* say they breed the *Le-prosie* ; the *Indies* make Coats of *Turkie*-feathers woven for their Children.

The *Partridge* is larger than ours, white flesh, but very dry, they are indeed a sort of *Partridges* called *Groofes*.

The *Pidgeon*, of which there are millions of millions, I have seen a flight of *Pidgeons* in the Spring, and at *Michaelmas* when they return back to the Southward for four or five miles, that to my thinking had neither beginning nor ending, length nor breadth, and so thick that I could see no Sun, they joyn Nest to Nest, and Tree to Tree by their Nests many miles together in *Pine-Trees*. But of late they are much diminished, the *English* taking them with Nets. I have bought at *Boston* a dozen of *Pidgeons* ready pull'd and garbidge for three pence

TRAVELS INTO NORTH AMERICA;

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A circumstantial Account of its Plantations
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The MANNERS of the INHABITANTS, and several curious
and IMPORTANT REMARKS on various Subjects.

BY PETER KALM,
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VOL. I.

WARRINGTON:
PRINTED by WILLIAM EYRES.
MDCCLXX.

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Sept., 1748

THIS country contains many species of the plant, which Dr. *Linnaeus* calls *Rhus*, and the most common is the *Rhus foliis pinnatis serratis lanceolates retrinque nudis*, or the *Rhus glabra*. The *English* call this plant *Sumach*. But the *Swedes* here, have no particular name for it, and therefore make use of the *English* name. Its berries or fruits are red. They are made use of for dying, and afford a colour like their own. This tree is like a weed in this country, for if a corn-field is left uncultivated for some few years together, it grows on it in plenty, since the berries are spread everywhere by the birds. And when the ground is to be ploughed the roots stop the plough very much. The fruit stays on the shrub during the whole winter. But the leaves drop very early in autumn, after they are

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turned reddish, like those of our *Swedish mountain ash*. The branches boiled with the berries afford a black ink like tincture. The boys eat the berries, there being no danger of falling sick after the repast; but they are very sour.

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Oct., 1748

October the 9th. PEASE are not much cultivated in *Pennsylvania* at present, though formerly, according to the accounts of some old *Swedes*, every farmer had a little field with pease. In *New Jersey* and the southern parts of *New York*, pease are likewise not so much cultivated as they used to be. But in the northern parts of *New York*, or about *Albany*, and in all the parts of *Canada* which are inhabited by the *French*, the people sow great quantities, and have a plentiful crop. In the former colonies, a little despicable insect has obliged the people to give up so useful a part of agriculture. This little insect was formerly

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little known, but a few years ago it multiplied excessively. It couples in summer, about the time when the pease are in blossom, and then deposits an egg into almost every one of the little pease. When the pease are ripe, their outward appearance does not discover the worm, which, how-

ever, is found within, when it is cut. This worm lies in the pea, if it is not stirred during all the winter, and part of the spring, and in that space of time consumes the greatest part of the inside of the pea: In spring therefore little more than the mere thin outward skin is left. This worm at last changes into an insect, of the coleoptera class, and in that state creeps through a hole of its own making in the husk, and flies off, in order to look for new fields of pease, in which it may couple with its cogenetic insects, and provide food sufficient for its posterity.

THIS noxious insect has spread from *Pennsylvania* to the north. For the country of *New York*, where it is common at present, has not been plagued with it above twelve or fifteen years ago; and before that time the people sowed pease every year without any inconvenience, and had excellent crops. But by degrees these little enemies came in such numbers, that the

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inhabitants were forced to leave off sowing of pease. The people complained of this in several places. The country people about *Albany* have yet the pleasure to see their fields of pease not infected by these beetles, but are always afraid of their approach; as it has been observed they come every year nearer to that province.

I KNOW not whether this insect would live in *Europe*, and I should think our *Swedish* winters must kill the worm, even if it be ever so deeply inclosed in the pea; notwithstanding it is often as cold in *New York* (where this insect is so abundant) as in our country, yet it continues to multiply here every year, and proceeds always farther to the north. I was very near bringing some of these vermin into *Europe*, without knowing of it.

At my departure from *America*, I took some sweet peas with me in a paper, and they were at that time quite fresh and green. But on opening the paper after my arrival at *Stockholm*, on *August* the 1st, 1751; I found all the peas hollow, and the head of an insect peeping out of each. Some of these insects even crept out, in order to try the weather of this new climate; but I made haste, to shut the paper again, in order to prevent the spreading of this

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noxious insect.* I own, that when I first perceived them, I was more frightened than I should have been at the sight of a viper. For I at once had a full view of the whole damage, which my dear country would have suffered, if only two or three of these noxious insects had escaped me. The posterity of many families, and even the inhabitants of whole provinces, would have had sufficient reason to detest me as the cause of so great a calamity. I afterwards lent some of them, though well secured, to count *Tessin*, and to Dr. *Linnaeus*, together with an account of their destructive qualities. Dr. *Linnaeus* has already inserted a description of them in an Academical Dissertation, which has been drawn up under his presidency, and treats of the damages made by insects.† He there calls this insect the *Bruchus* of *North-America*.‡ It

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was very peculiar that every pea in the paper was eaten without exception.

WHEN the inhabitants of *Pensylvania* sow pease procured from abroad they are not commonly attacked by these insects for the first year; but in the next they take possession of the pease. It is greatly to be wished that none of the ships which annually depart from *New York* or *Pensylvania*, may bring them into the *European* countries. From hence the power of a single despicable insect will plainly appear; as also, that the study of the œconomy and of the qualities of insects, is not to be looked upon as a mere pastime and useless employment.*

THE *Rhus radicans* is a shrub or tree which grows abundantly in this country, and has in common with the ivy called *Hedera arborea*, the quality of not growing without the support of either a tree, a wall, or a hedge. I have seen it climbing to the very top of high trees in the

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woods, and its branches shoot out every where little roots, which fasten upon the tree, and as it were enter into it. When the stem is cut, it emits a pale brown sap of a disagreeable scent. This sap is so sharp, that the letters and characters made upon linen with it,

cannot be got out again, but grow blacker the more the cloth is washed. Boys commonly mark their names on their linen with this juice. If you write with it on paper, the letters never go out, but grow blacker from time to time.

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Dec., 1748

SEVERAL persons likewise assured us that we should have rain before to-morrow night. The reason they gave for this conjecture was, that this morning at sun rising, from their windows they had seen every thing very plainly on the other side of the river, so that it appeared much nearer than usual, and that this commonly foreboded rain. This presage was likewise pretty exactly fulfilled.

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V O L. II.

L O N D O N :

Printed for the EDITOR;
And Sold by T. LOWNDES, in Fleet-street.
MDCCLXXI.

Between Forts Anne and St. Frederic.

TOWARDS night we met with a *French* serjeant, and six *French* soldiers, who were sent by the commander of Fort *St. Frederic*, to accompany three *Englishmen* to *Saratoga*, and to defend them in case of necessity, against six *French Indians*, who were gone to be revenged on the *English*, for killing the brother of one of them in the last war. The peace was already concluded at that time, but as it had not yet been proclaimed in *Canada*, the *Indians* thought they could take this step; therefore they silently got away, contrary to the order of the Governor of *Montreal*, and went towards the *English* plantations. We here had occasion to admire the care of Providence for us, in escaping these barbarians. We found the grass trod down all the day along, but had no thoughts of dan-

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ger, as we believed that every thing was quiet and peaceable. We were afterwards informed, that these *Indians* had trod the grass down, and passed the last night in the place where we found the burning brands in the morning. The usual road which they were to take, was by Fort *Anne*, but to shorten their journey they had gone an unfrequented road. If they had gone on towards Fort *Anne*, they would have met us without doubt, and looking upon us all as *Englishmen*, for whose blood they were gone out, they could easily have surprised and shot us all, and by that means have been rid of the trouble of going any further to satisfy their cruelty. We were greatly struck when the *Frenchmen* told us how near death we had been to-day. We passed the night here, and though the *French* repeatedly advised and desired me not to venture any further with my company, but to follow them to the first *English* settlement, and then back to Fort *St. Frederic*, yet I resolved, with the protection of the Almighty, to continue my journey the next day.

WE saw immense numbers of those wild pigeons flying in the woods, which sometimes come in incredible flocks to the southern *English* colonies, most of the in-

bitants not knowing where they come from. They have their nests in the trees here; and almost all the night make a great noise and cooing in the trees, where they roost.

The *Frenchmen* shot a great number of them, and gave us some, in which we found a great quantity of the seeds of the elm, which evidently demonstrated the care of Providence in supplying them with food; for in *May* the seeds of the red maple, which abounds here, are ripe, and drop from the trees, and are eaten by the pigeons during that time: afterwards, the seeds of the elm ripen, which then become their food, till other seeds ripen for them. Their flesh is the most palatable of any bird's flesh I ever tasted.

ALMOST every night, we heard some trees crack and fall, whilst we lay here in the wood, though the air was so calm that not a leaf stirred. The reason of this breaking I am totally unacquainted with. Perhaps the dew loosens the roots of trees at night; or, perhaps there are too many branches on one side of the tree. It may be, that the above-mentioned wild pigeons settle in such quantities on one tree as to weigh it down; or perhaps the tree begins to bend more and more to one side, from its center of gravity, making the weight always greater

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for the roots to support, till it comes to the point, when it can no longer be kept upright, which may as well happen in the midst of a calm night as at any other time. When the wind blows hard, it is reckoned very dangerous to sleep or walk in the woods, on account of the many trees which fall in them; and even when it is very calm, there is some danger in passing under very great and old trees. I was

told, in several parts of *America*, that the storms or hurricanes sometimes only pass over a small part of the woods, and tear down the trees in it; and I have had opportunities of confirming the truth of this observation, by finding places in the forests, where almost all the trees were thrown down, and lay all in one direction.

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ON our left we saw an old fortification of stones laid above one another; but nobody

could tell me whether the *Indians* or the *Europeans* had built it.

WE had rowed very fast all the afternoon, in order to get forward; and we thought that we were upon the true road, but found ourselves greatly mistaken: for towards night we observed, that the reeds in the river bent towards us, which was a mark that the river likewise flowed towards us; whereas, if we had been on the true river, it should have gone with us.

We likewise observed, from the trees which lay across the river, that nobody had lately passed that way, though we should have seen the steps of the *Frenchmen* in the grass along the shore, when they brought their boat over these trees. At last, we plainly saw that the river flowed against us, by several pieces of wood which floated slowly towards us; and we were convinced, that we had gone twelve *English* miles, and upwards, upon a wrong river, which obliged us to return, and to row till

II, 317

very late at night. We sometimes thought, through fear, that the *Indians*, who were gone to murder some *English*, would unavoidably meet with us. Though we rowed very fast, yet we were not able to-day to get half-way back to the place where we first left the true river.

TRAVELS INTO NORTH AMERICA;

CONTAINING

ITS NATURAL HISTORY, AND
A circumstantial Account of its Plantations
and Agriculture in general,

WITH THE

CIVIL, ECCLESIASTICAL AND COMMERCIAL
STATE OF THE COUNTRY,

The MANNERS of the INHABITANTS, and several curious
and IMPORTANT REMARKS on various Subjects.

By PETER KALM,

Professor of Oeconomy in the University of *Abo* in Swedish
Finland, and Member of the *Swedish* Royal Academy of
Sciences.

TRANSLATED INTO ENGLISH

By JOHN REINOLD FORSTER, F.A.S.

Enriched with a Map, several Cuts for the Illustration of
Natural History, and some additional Notes.

V O L. III.

L O N D O N :

Printed for the EDITOR;

And Sold by T. LOWNDES, in Fleet-street.

MDCCLXXI.

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July, 1749

Fort St. Frederic.

July the 8th. THE *Galium tinctorium* is called *Tifavojaune rouge* by the *French* throughout all *Canada*, and abounds in the woods round this place, growing in a moist but fine soil. The roots of this plant are employed by the *Indians* in dyeing the quills of the *American* porcupines red, which they

III, 15

put into several pieces of their work; and air, sun, or water seldom change this colour.

The *French* women in *Canada* sometimes dye their clothes red with these roots, which are but small, like those of *Galium luteum*, or yellow bedstraw.

THE horses are left out of doors during the winter, and find their food in the woods, living upon nothing but dry plants, which are very abundant; however they do not fall off by this food, but look very fine and plump in spring.

July the 9th. THE skeleton of a whale was found some *French* miles from *Quebec*, and one *French* mile from the river *St. Laurence*, in a place where no flowing water comes to at present. This skeleton has been of a very considerable size, and the governor of the fort said, he had spoke with several people who had seen it.

III, 28

THE *Asclepias Syriaca*, or, as the *French* call it, *le Cottonier*, grows abundant in the country, on the sides of hills which ly near rivers and other situations, as well in a dry and open place in the woods, as in a rich, loose soil. When the stalk is cut or broken it emits a lactescent juice, and for this reason the plant is reckoned

in some degree poisonous. The French in Canada nevertheless use its tender shoots in spring, preparing them like asparagus; and the use of them is not attended with any bad consequences, as the slender shoots have not yet had time to suck up any thing poisonous. Its flowers are very odoriferous, and, when in season, they fill the woods with their fragrant exhalations, and make it agreeable to travel in them; especially in the evening. The French in Canada make a sugar of the flowers, which for that purpose are gathered in the morning, when they are covered all over with dew. This dew is expressed, and by boiling yields a very good brown, palatable

III, 29

sugar. The pods of this plant when ripe contain a kind of wool, which encloses the seed, and resembles cotton, from whence the plant has got its French name. The poor collect it, and fill their beds, especially their children's, with it instead of feathers. This plant flowers in Canada at the end of June and beginning of July, and the seeds are ripe in the middle of September. The horses never eat of this plant.

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1749

Quebec.

August the 7th. Ginseng is the current French name in Canada, of a plant, the root of which, has a very great value in China*. It has been growing since times immemorial in the Chinese Tartary and in Corea, where it is annually collected and brought to China. Father Du Halde says, it is the most precious, and the most useful of all the plants in eastern Tartary, and attracts, every year, a number of people into the deserts of that country. The Man-

techoux-Tartars call it *Orhota*, that is the most noble, or the queen of plants†. The Tartars and Chinese praise it very much, and ascribe to it the power of curing several dangerous diseases, and that of restoring to the body new strength, and supplying the loss caused by the exertion of the mental, and corporeal faculties. An ounce of Ginseng bears the surprizing price of seven or eight ounces of silver at Peking. When the French botanists in Canada first saw a figure of it, they remembered to have seen

* Botanists know this plant by the name of *Panax quinquefolium*, foliis ternatis quinatis LINN. Mat. Med. § 116. Sp. plant. p. 15. 12. Gronov. Fl. Virg. p. 147. See likewise Catesby's Nat. Hist of Carolina. Vol. III. p. 16. t. 16. Laffitau Ginf. 51. t. 1. Father Charlevoix Hist. de la Nouvelle France. Tom. IV. p. 308. fig. XIII. and Tom. V. p. 24.

† Peter Osbeck's voyage to China, Vol. I. p. 223.

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a familiar plant in this country. They were confirmed in their conjecture by considering that several settlements in Canada, ly under the same latitude with those parts of the Chinese Tartary, and China, where the true Ginseng grows wild. They succeeded in their attempt, and found the same Ginseng wild and abundant in several parts of North-America, both in French and English plantations, in plain parts of the woods. It is fond of shade, and of a deep rich mould, and of land which is neither wet nor high. It is not every where very common, for sometimes one may search the woods for the space of several miles without finding a single plant of it; but in those spots where it grows it is always found in great abundance. It flowers in May and June, and its berries are ripe at the end of August. It bears transplanting very well, and will soon thrive in its new ground. Some people here, who have gathered the berries, and put them into their kitchen gardens, told me that they lay one or two years in the ground without coming up.

The Iroquese, or Five (Six) Nations, call the Ginseng roots *Garangteging*, which it is said signifies a child, the roots bearing a faint resemblance to it: but others are of opinion that they mean the thigh and leg by it, and

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the roots look pretty like it. The French use this root for curing the asthma, as a stomachic, and to promote fertility in woman. The trade which is carried on with it here is very brisk; for they gather great quantities of it, and send them to France, from whence they are brought to China, and sold there to great advantage*. It is said the merchants in France met with amazing success in this trade at the first outset, but by continuing to send the Ginseng over to China, its price is fallen considerably there, and consequently in France and Canada; however, they still find their

account in it. In the summer of 1748, a pound of *Ginseng* was sold for six Francs, or Livres, at *Quebec*; but its common price here is one hundred Sols, or five Livres.

During my stay in *Canada*, all the merchants at *Quebec* and *Montreal*, received orders from their correspondents in *France* to send over a quantity of *Ginseng*, there being an uncommon demand for it this summer.

The roots were accordingly collected in *Canada* with all possible diligence; the

* Mr. *Osbeck* seems to doubt whether the *Europeans* reap any advantages from the *Ginseng* trade or not, because the *Chinese* do not value the *Canada* roots so much as those of the *Chinese-Tartary* and therefore the former bear scarce half the price of the latter. See *Osbeck's Voyage to China*, Vol. I. p. 223. F.

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Indians especially travelled about the country in order to collect as much as they could together, and to sell it to the merchants at *Montreal*. The *Indians* in the neighbourhood of this town were likewise so much taken up with this business, that the *French* farmers were not able during that time to hire a single *Indian*, as they commonly do, to help them in the harvest. Many people feared lest by continuing for several successive years, to collect these plants without leaving one or two in each place to propagate their species, there would soon be very few of them left; which I think is very likely to happen, for by all accounts they formerly grew in abundance round *Montreal*, but at present there is not a single plant of it to be found, so effectually have they been rooted out. This obliged the *Indians* this summer to go far within the *English* boundaries to collect these roots. After the *Indians* have sold the fresh roots to the merchants, the latter must take a great deal of pains with them. They are spread on the floor to dry, which commonly requires two months and upwards, according as the season is wet or dry. During that time they must be turned once or twice every day, lest they should putrify or moulder.

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The sand-reed * grows in abundance in the sand, and prevents its being blown about by the wind.

The sea-lyme grass † likewise abounds on the shores. Both it and the preceding plant are called *Seigle de mer* ‡ by the

* *Arundo arvensis* Linn.
† *Elymus arvensis* Linn.
‡ Sea-rye.

French. I have been assured that these plants grow in great plenty in *Newfoundland*, and on other *North-American* shores; the places covered with them looking, at

III, 211

Cap aux Oyes.

a distance, like corn-fields; which might explain the passage in our northern accounts, of the excellent wine land *, which mentions, that they had found whole fields of wheat growing wild.

THE sea-side plantain † is very frequent on the shore. The *French* boil its leaves in a broth on their sea-voyages, or eat them as a sallad. It may likewise be pickled like samphire.

THE bear-berries ‡ grow in great abundance here. The *Indians*, *French*, *English*, and *Dutch*, in those parts of *North-America*, which I have seen, call them *Sagackhomi*, and mix the leaves with tobacco for their use.

GALE, or Sweet willow §, is likewise abundant here. The *French* call it *Laurier*, and some *Poirrier*. They put the leaves into their broth, to give it a pleasant taste.

THE sea-rocket || is, likewise, not un-

* *Vinland det goda*, or the good wine-land, is the name which the old *Scandinavian* navigators gave to *America*, which they discovered long before *Columbus*. See *Torfs Historie Vinlandiæ antiquæ s. partis Americæ septentrionalis*, Hafniæ 1715, 4to. and Mr. *George Westmann's*, A. M. Dissertation on that Subject. Abo 1747. F.

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common. Its root is pounded, mixed with flour, and eaten here, when there is a scarcity of bread.

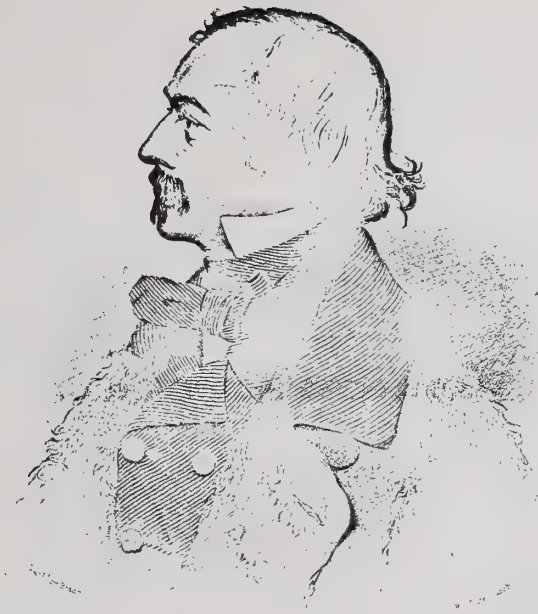
THE forb-tree, or mountain-ash, the cranberry-bush, the juniper-tree, the sea-side pease, the *Linnaea*, and many other *Swedish* plants, are likewise to be met with here.

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THE women dye their woollen yarn yellow with seeds of 'gale,' which is called *porurier* here, and grows abundant in wet places.

THIS evening, M. *Gaulthier* and I went to see the water-fall at *Montmorenci*. The country near the river is high and level; and laid out into meadows. Above them the high and steep hills begin, which are covered with a crust of mould, and turned into corn-fields.

† *Plantago maritima* Linn.
‡ *Arbutus uva ursi* Linn.
§ *Myrica gale* Linn.
|| *Bunias celtica* Linn.



E. H. KANE, U. S. N.

E. H. Kane

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CHAPTER V.

CRIMSON CLIFFS OF BEVERLEY—HAKLUYT AND NORTHUMBERLAND
—RED SNOW—THE GATES OF SMITH'S STRAITS—CAPE ALEXAN-
DER—CAPE HATHERTON—FAREWELL CAIRN—LIFE-BOAT DEPÔT
—ESQUIMAUX RUINS FOUND—GRAVES—FLAGSTAFF POINT.

My diary continues:—

"We passed the 'Crimson Cliffs' of Sir John Ross in the forenoon of August 5th. The patches of red snow, from which they derive their name, could be seen clearly at the distance of ten miles from the coast. It had a fine deep rose hue, not at all like the brown stain which I noticed when I was here before. All the gorges and ravines in which the snows had lodged were deeply tinted with it. I had no difficulty now in justifying the somewhat poetical nomenclature which Sir John Franklin applied to this locality; for if the snowy surface were more diffused, as it is no doubt earlier in the season, crimson would be the prevailing color."

"Late at night we passed Conical Rock, the most insulated and conspicuous landmark of this coast; and, still later, Wolstenholme and Saunder's Islands, and Oomenak, the place of the 'North Star's' winter-quar-

ARCTIC EXPLORATIONS

IN THE YEARS 1853, '54, '55

BY

EDWIN KENT KANE, M. D., U. S. N.



VOL. I.

PHILADELPHIA

GRIBBIS AND PATTERSON,

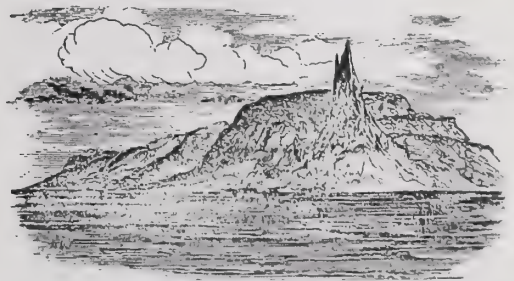
12 N. 2ND ST.

1856 [1856]

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ters:—an admirable day's run; and so ends the 5th of August. We are standing along, with studding-sails set, and open water before us, fast nearing our scene of labor. We have already got to work sewing up blanket bags and preparing sledges for our campaigns on the ice."

We reached Hakluyt Island in the course of the next day. I have only this wood-cut to give an idea of its



HAKLUYT POINT, FROM NORTH-NORTHWEST.

TRACKING—INSPECTING A HARBOR—THE MUSK OX—STILL TRACKING—CONSULTATION—WARPING AGAIN—AGROUND NEAR THE ICE-FOOT—A BREATHING SPELL—THE BOAT EXPEDITION—DEPARTURE.

It was not until the 22d that the storm abated, and our absent men were once more gathered back into their mess. During the interval of forced inaction, the little brig was fast to the ice-belt which lined the bottom of the cliffs, and all hands rested; but as soon as it was over, we took advantage of the flood-tide to pass our tow-lines to the ice-beach, and, harnessing ourselves in like mules on a canal, made a good three miles by tracking along the coast.

"August 22, Monday.—Under this coast, at the base of a frowning precipice, we are now working toward a large bay which runs well in, facing at its opening to the north and west. I should save time if I could cross from headland to headland; but I am obliged to follow the tortuous land-belt, without whose aid we would go adrift in the pack again.

"The trend of our line of operations to-day is almost

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due east. We are already protected from the south, but fearfully exposed to a northerly gale. Of this there are fortunately no indications.

"August 23, Tuesday.—We tracked along the ice-belt for about one mile, when the tide fell, and the brig grounded, heeling over until she reached her bearings. She rose again at 10 P.M., and the crew turned out upon the ice-belt.

"The decided inclination to the eastward which the shore shows here is important as a geographical feature; but it has made our progress to the actual north much less than our wearily-earned miles should count for us. Our latitude, determined by the sun's lower culmination, if such a term can be applied to his midnight depression, gives $78^{\circ} 41'$. We are farther north, therefore, than any of our predecessors, except Parry on his Spitzbergen foot-tramp. There are those with whom, no matter how insuperable the obstacle, failure involves disgrace: we are safe at least from their censure.

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CHAPTER X.

APPROACHING WINTER—STORING PROVISIONS—BUTLER STOREHOUSE—SUNDAY AT REST—BUILDING OBSERVATORY—TRAINING THE DOGS—THE LITTLE WILLIE—THE ROAD—THE FAITH—SLEDGING—RECONNOISSANCE—DÉPÔT PARTY.

The winter was now approaching rapidly. The

thermometer had fallen by the 10th of September to 14° , and the young ice had cemented the floes so that we could walk and sledge round the brig. About sixty paces north of us an iceberg had been caught, and was



RENSSELAER HARBOR.

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frozen in: it was our neighbor while we remained in Rensselaer Harbor. The rocky islets around us were fringed with hummocks; and, as the tide fell, their sides were coated with opaque crystals of bright white. The birds had gone. The sea-swallows, which abounded when we first reached here, and even the young burgo-masters that lingered after them, had all taken their departure for the south. Except the snow-birds, these are the last to migrate of all the Arctic birds.

"September 10, Saturday.—We have plenty of responsible work before us. The long 'night in which no man can work' is close at hand: in another month we shall lose the sun. Astronomically, he should disappear on the 24th of October if our horizon were free; but it is obstructed by a mountain ridge, and, making all allowance for refraction, we cannot count on seeing him after the 10th.

"First and foremost, we have to unstow the hold, and deposit its contents in the storehouse on Butler Island. Brooks and a party are now briskly engaged in this double labor, running loaded boats along a canal that has to be recut every morning.

"Next comes the catering for winter diet. We have little or no game as yet in Smith's Sound; and, though the traces of deer that we have observed may be followed by the animals themselves, I cannot calculate upon them as a resource. I am without the hermetically-sealed meats of our last voyage; and the use of salt meat in circumstances like ours is never safe.

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"I left Hans as hunter. I gave him a regular exemption from all other labor, and a promised present to

his lady-love on reaching Fiskernaes. He signaled his
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promotion by shooting two deer, *Tukukuk*, the first yet shot. We have now on hand one hundred and forty-five pounds of fine venison, a very gift of grace to our diseased crew. But, indeed, we are not likely to want for wholesome food, now that the night is gone, which made our need of it so pressing.

On the first of May, those charming little migrants the snow-birds, *ultima cœlicolum*, which only left us on the 4th of November, returned to our ice-crusts rocks, whence they seem to 'fill the sea and air with their sweet jargoning.' Seal literally abound too. I have learned to prefer this flesh to the reindeer's, at least that of the female seal, which has not the fœtor of her mate's.

"By the 12th, the sides of the Advance were free from snow, and her rigging clean and dry. The floe is rapidly undergoing its wonderful processes of decay; and the level ice measures but six feet in thickness. To-day they report a burgomaster gull seen; one of the earliest but surest indications of returning open water. It is not strange, ice-leaguers exiles as we are, that we observe and exult in these things. They are the pledges of renewed life, the olive-branch of this dreary waste: we feel the spring in all our pulses.

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VOLUME TWO

"February 23, Friday.—Hans was out early this morning on the trail of the wounded deer. Rhina, the least barbarous of our sledge-dogs, assisted him. He was back by noon, with the joyful news, 'The tukuk dead only two miles up big fiord!' The cry found its way through the hatch, and came back in a broken huzza from the sick men.

"We are so badly off for strong arms that our reindeer threatened to be as great an embarrassment to us as the auction drawn-elephant was to his lucky master. We had hard work with our dogs carrying him to the brig, and still harder, worn down as we were, in getting him over the ship's side. But we succeeded, and were tumbling him down the hold, when we found ourselves in a dilemma like the Vicar of Wakefield with his family picture. It was impossible to drag the prize into our little moss-lined dormitory; the *tossut* was not half big enough to let him pass: and it was equally impossible to skin him anywhere else without freezing our fingers in the operation. It was a happy escape from the embarrassments of our hungry little council to determine that the animal might be carved before skinning as well as he could be afterward; and in a

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very few minutes we proved our united wisdom by a feast on his quartered remains.

"It was a glorious meal, such as the compensations of Providence reserve for starving men alone. We ate, forgetful of the past, and almost heedless of the morrow; cleared away the offal wearily: and now, at 10 P.M., all hands have turned in to sleep, leaving to their commanding officer the solitary honor of an eight hours' vigil.

"This deer was among the largest of all the northern specimens I have seen. He measured five feet one inch in girth, and six feet two inches in length, and stood as large as a two years' heifer. We estimated his weight at three hundred pounds gross, or one hundred and eighty net. The head had a more than usually cumbrous character, and a long waving tuft of white hair, that depended from the throat, gave an appearance of excessive weight to the front view.

"The reindeer is in no respect a graceful animal. There is an apparent want of proportion between his cumbrous shoulders and light haunch, which is ungainly even in his rapid movements. But he makes up for all his defects of form when he presents himself as an article of diet.

"February 24, Saturday.—A bitter disappointment met us at our evening meal. The flesh of our deer was nearly uneatable from putrefaction; the liver and intestines, from which I had expected so much, utterly so. The rapidity of such a change, in a temperature so low as minus 35°, seems curious; but the Green-

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landers say that extreme cold is rather a promoter than otherwise of the putrefactive process. All the graminivorous animals have the same tendency, as is well known to the butchers. Our buffalo-hunters, when they condescend to clean a carcass, do it at once; they have told me that the musk-ox is sometimes tainted after five minutes' exposure. The Esquimaux, with whom there is no fastidious sensibility of palate, are in the practice at Yotlik and Horses' Head, in latitude 73° 40', even in the severest weather, of withdrawing the viscera immediately after death and filling the cavity with stones.

"February 25, Sunday.—The day of rest for those to whom rest can be; the day of grateful recognition for all! John, our volunteer cook of yesterday, is down: Morton, who could crawl out of bed to play baker for the party, and stood to it manfully yesterday, is down too. I have just one man left to help me in caring for the sick. Hans and Petersen, thank God! have vitality enough left to bear the toils of the hunt. One is out with his rifle, the other searching the traps.

"To-day, blessed be the Great Author of Light! I have once more looked upon the sun. I was standing

on deck, thinking over our prospects, when a familiar berg, which had long been hid in shadow, flashed out in sun-birth. I knew this berg right well: it stood between Charlotte Wood Fiord and Little Willie's Monument. One year and one day ago I travelled toward it from Fern Rock to catch the sunshine.

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THE POLAR SEASONS.

The lake abounds in fish, apparently the salmon-trout; but the natives have not the art of fishing. The stream, which tunnels its way out near the glacier-foot, is about ten feet in diameter; and I was assured that it never completely suspends its flow. Although the tunnel closes with ice, and the surface of the lake freezes for many feet below, the water may still be seen and heard beneath, even in midwinter, wearing its way at the base of the glacier.

This fact is of importance, as it bears upon the temperature of deep ice-beds. It shows that with an atmosphere whose mean is below zero throughout the year, and a mean summer heat but 4° above the freezing-point, these great Polar glaciers retain a high interior temperature not far from 32° , which enables them to resume their great functions of movement and discharge readily, when the cold of winter is at an end, and not improbably to temper to some extent the natural rigor of the climate. Even in the heart of the ice nature has her compensations.

The phases of the Polar year so blend and separate that it is difficult to distribute them into seasons. In the Arctic latitudes a thousand miles to the south, travellers speak of winter and summer as if the climate underwent no intermediate changes. But nature impresses no such contrasts upon any portion of her realm; and, whatever may be the registrations of the meteorologist, the rude Esquimaux of these icy soli-

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tudes derives from his own experience and necessities a more accurate and practical system of notation.

He measures his life by winters, as the American Indian does by the summers, and for a like reason. Winter is for him the great dominant period of the year: he calls it "okipok," the season of fast ice.

But when the day has come again, and the first thawing begins to show itself in the sunshine, as winter declines before the promise of spring, he tells you that it is "upernasak," the time of water-drops. It is then the snow-bird comes back and the white ptarmigan takes a few brown feathers. His well-known heath, too, the irsutec, (*Andromeda tetragona*), is green again below its dried stems under the snow.

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But it is not in the season of thaws only that these

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wonderful geological changes take place. Large rocks are projected in the fall by the water freezing in the crevices, like the Mons Meg cannon-balls. Our old boat, the "Forslorn Hope," the veteran of my Beechy Island attempt, was stove in by one of these while drawn up under the cliffs of "Ten-mile Gorge."

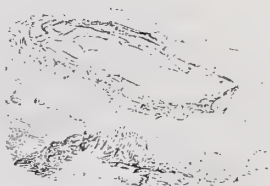
The rocks which fell in this manner upon the ice-belt were rapidly imbedded by the action of the sun's heat; and it happened frequently, of course, that one more recently disengaged would overlies another that had already sunk below the surface. This, as the ice-belt subsided in the gradual thaw, had given many examples of the rocking-stone. I have placed in the margin



LIMESTONE ON MICA SLATE.



GREENSTONE ON GNEISS.



LIMESTONE ON GREENSTONE.



GNEISS ON GREENSTONE.

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Our domestic system was organized with the most exact attention to cleanliness, exercise, recreation, and withal to fixed routine.

During the winter which followed, the sun was one hundred and twenty days below the horizon; and, owing to a range of hills toward our southern meridian, the maximum darkness was not relieved by apparent twilight even at noonday.

The atmospheric temperatures were lower than any that had been recorded by others before us. We had adopted every precaution to secure accuracy in these observations, and the indications of our numerous thermometers—alcoholic, ethereal, and mercurial—were registered hourly.

From them it appears that the mean annual temperature of Rensselaer Harbor, as we named our winter home, is lower than that of Melville Island, as recorded by Parry, by two degrees. In certain sheltered positions, the process of freezing was unintermitted for any consecutive twenty-four hours throughout the year.

The lowest temperature was observed in February, when the mean of eight instruments indicated minus 70° Fahrenheit. Chloroform froze; the essential oils of sassafras, juniper, cubebs, and winter-green, were resolved into mixed solid and liquid; and on the morning of February 24 we witnessed chloric ether congealed for the first time by a natural temperature.

THE

U. S. GRINNELL EXPEDITION

IN

SEARCH OF SIR JOHN FRANKLIN.

A Personal Narrative.

BY

ELISHA KENT KANE, M.D., U.S.N.

NEW YORK:

HARPER & BROTHERS, PUBLISHERS,

329 & 331 PEARL STREET,

FRANKLIN SQUARE.

1854.

46

DISCO.

We felt that we could now look forward to the winter with comparative trust.



Of Disco, save its Esquimaux huts, its oil-house, its smith-shop, its little school, and its gubernatorial mansion, I can say but little. Its statistics, vital, political, or economic, would have little interest for the readers of this narrative. But my limited florula, gathered as I made a few hasty walks under the guidance of our hospitable and intelligent friend, the governor,

Disco is the largest circumnavigable island on the coast of Greenland.

may be worth a notice.

In a ravine, back of the settlement, the washings of the melted snows had accumulated, in little escalades or terraces, a scanty mould, rich with Arctic growths.

The mosses, which met the lichens at a sort of neutral ground between rock and soil, were particularly rich. So sodden were they with the percolating waters, that you sank up to your ankles. Nestling curiously under their protecting tufts rose a complete parterre of tinted flowers, consisting of Gentians, Ranunculus, Ledum, Draba, Potentilla, Saxifrages, Poppy, and Sedums.

The Arctic turf is unequalled: nothing in the trop-

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ics approaches it for specific variety, and in density it far exceeds its Alpine congener. Two birches (*Betula alba* and *B. nana*), three willows (*Salix lanata*, *S. glauca*, and *S. herbacea*), that noble heath, the Andromeda (*A. tetragona*), the whortle-berry (*Vaccinium vitis-idea* and *V. uliginosum*), the crow-berry (*Empetrum nigrum*), and a Potentilla, were, in one instance, all wreathed together in a matted sod, from whose intricate net-work, rising within an area of a single foot, I counted no less than six species of flowering plants.

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The weakness of individual growth allowed no ambitious species to overpower its neighbor, so that many families were crowded together in a rich flower-bed. In a little space that I could cover with my pea-jacket, the veined leaves of the Pyrola were peeping out among chickweeds and saxifrages, the sorrel and Ranunculus. I even found a

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poor gentian, stunted and reduced, but still, like every thing around it, in all the perfection of miniature proportions.

As this mossy parterre approached the rocky walls that hemmed it in, tussocks of sedges and coarse grass began to show themselves, mixed with heaths and birches; and still further on, at the margin of the horse-shoe, and fringing its union with the stupendous piles of debris, came an annulus of Arctic shrubs and trees.

Shrubs and trees! the words recall a smile, for they only typed those natives of another zone. The poor things had lost their uprightness, and learned to escape the elements by trailing along the rocks. Few rose above my shoes, and none above my ankles; yet shady alleys and heaven-pointing avenues could not be more impressive examples of creative adaptation. Here I saw the bleaberry (*Vaccinium uliginosum*) in flower and in fruit—I could cover it with a wine-glass; the wild honeysuckle (*Azalea procumbens*) of our Pennsylvania woods—I could stick the entire plant in my button-hole; the *Andromeda tetragona*, like a green marabou feather.

Strangest among these transformations came the willows. One, the *Salix herbacea*, hardly larger than a trefoil clover; another, the *S. glauca*, like a young althea, just bursting from its seed.

AN
INTRODUCTION
TO
ENTOMOLOGY:
OR
ELEMENTS
OF THE
NATURAL HISTORY OF INSECTS:

WITH PLATES.

By WILLIAM KIRBY, M.A. F.L.S.
RECTOR OF BARHAM,

AND
WILLIAM SPENCE, Esq. F.L.S.

VOL. I.

LONDON:

PRINTED FOR LONGMAN, HURST, REES, ORME, AND BROWN,
PATERNOSTER-ROW.

1815.

I, 147

No quadruped is more infested by the *Æstrus*, or gad-fly, sometimes also called the breese, than the horse. In this country no fewer than three species attack it. The most common sort, known by the name of the horse-bee (*Æ. Equi*, Clark), deposits its eggs (which being covered with a slimy substance adhere to the hairs) on such parts of the body as the animal can reach with its tongue; and thus, unconscious of what it is doing, it unwarily introduces into its own citadel the troops of its enemy.—Another species (*Æ. hæmorrhoidalis*, L.) is still more troublesome to it, ovipositing upon the lips; and in its endeavours to effect this, from the excessive titillation it occasions, giving the poor beast the most distressing uneasiness. At the sight of this fly horses are always much agitated, tossing their heads about in the air to drive it away; and, if this does not answer, galloping off to a distant part of their pasture, and, as their last resource, taking refuge in the water, where the gad-flies never follow them. We learn from Reaumur, that in France the grooms, when they observe any bots (which is the vulgar name for the larvæ and pupæ of *Æstri*) about the anus of a horse or in its dung, thrust their hand into the passage to search for more;

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Another quadruped contributing greatly to our domestic comfort, from which we derive a considerable portion of our animal food, and which, on account of its patient and laborious character when employed in agriculture, is an excellent substitute for the horse, (you will directly perceive I am speaking of the ox, whether male or female,) is also not exempt from insect domination. At certain seasons the whole terrified herd, with their tails in the air, or turned upon

I, 150

their backs, or stiffly stretched out in the direction of the spine, gallop about their pastures, making the country re-echo with their lowings, and finding no rest till they get into the water. Their appearance and motions are at this time so grotesque, clumsy, and seemingly unnatural, that we are tempted rather to laugh at the poor beasts than to pity them, though evidently in a situation of great terror and distress. The cause of all this agitation and restlessness is a small gad-fly, (*Æ. Bovis*, L.), less than the horse-bee, the object of which, though it be not to bite them, but merely to oviposit in their hides, is not put into execution without giving them considerable pain. Virgil, in his Georgics, has beautifully and accurately described the effects of the approach and assault of the *Æstrus* upon the cattle.

When oxen are employed in agriculture, the attack of this fly is often attended with great danger, since

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they then become perfectly unmanageable; and, whether in harness or yoked to the plough, will run directly forward. At the season when the *Æstrus* infests them, close attention should be paid, and their harness so constructed that they may easily be let loose.

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—Perhaps you are not aware that the bots we are speaking of, or rather those in the head of goats, have been prescribed as a remedy for the epilepsy, and that from the tripod of Delphos. Yet so we are told on the authority of Alexander Trallien. Whether Democrates, who consulted the oracle, was cured by this remedy does not appear; the story shows however that the ancients were aware of the station of these larvæ. The common saying that a whimsical person is maggotly, or has got maggots in his head, perhaps arose from the freaks the sheep have been observed to exhibit when infested by their bots.

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How dear are their books, their cabinets of the various productions of nature, and their collections of prints and other works of art and science, to the learned, the scientific, and the virtuosi! Even these precious treasures have their insect enemies. The larva of *Crambus pinguinalis*, whose ravages in another quarter I

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have noticed before*, will establish itself upon the bind-

ing of a book, and spinning a robe, which it covers with its own excrement^b, will do it no little injury. A mite, (*Acarus eruditus*, Schrank) eats the paste that fastens the paper over the edges of the binding, and so loosens it^c. I have also often observed the caterpillar of another little moth, of which I have not ascertained the species, that takes its station in damp old books, between the leaves, and there commits great ravages; and many a black-letter rarity, which in these days of Bibliomania would have been valued at its weight in gold, has been snatched by these destroyers from the hands of book-collectors.

The little wood-boring beetles before mentioned (*Anobium pertinax* and *striatum*) also attack books, and will even bore through several volumes. M. Peignot mentions an instance where, in a public library but little frequented, *twenty-seven folio volumes* were perforated in a straight line by the same insect, (probably one of these species,) in such a manner that on passing a cord through the perfectly round hole made by it, these twenty-seven volumes could be raised at once^d. The animals last mentioned also destroy prints and drawings, whether framed, or preserved in a porte-feuille.

I, 274 The earwig that haunts every close place in our gardens, and defiles whatever it enters, probably in some degree makes up for its ravages by diminishing the number of other insects. The cowardly and cruel Mantis, which runs away from an ant, will destroy in abundance helpless flies, using its anterior tibiae, which with the thigh form a kind of forceps, to seize its prey.

The water-scorpions (*Nepa*, *Ranatra*, and *Naucoris*), whose fore-legs are made like those of the Mantis, the water-boatman (*Notonecta*), which always swims upon its back, and the Sigara, all live by rapine, and prey upon aquatic insects. Some of this tribe are so savage that they seem to love destruction for its own sake. One (*Nepa cinerea*) which was put into a basin of water with several young tadpoles, killed them all without attempting to eat one.

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fond of ants and of honey; which last is also said to be a favourite article with the fox, who has sometimes the audacity to overturn bee-hives, and even to attack wasps' nests in search of it. He will also eat beetles.

Sparmann has given an amusing account of the honey-ratel, (*Viverra melliivora*), which has a particular instinct enabling it to discover bees, and attack them in their entrenchments. Near sun-set the ratel will sit and hold one of his paws before his eyes, in order to get a distinct view of the object of his pursuit; and when, in consequence of his peering about in this manner, he sees any bees flying, he knows that at this time of the day they are making for their habitations, whither he follows them, and so attains his end^a. Another species of *Viverra* (*V. prchensilis*) is also reputed to be an eager insect-hunter. The young armadillos feed on a species of locust; but no quadruped can with more

propriety be called insectivorous than the ant-eaters (*Myrmecophaga*), which, as their name imports, live upon ants. The great ant-eater, when he comes to an ant-hill, scratches it up with his long claws, and then unfolds his slender worm-like tongue, (which is more than two feet long, and wet with saliva,) and when covered with ants draws it back into his mouth and swallows thousands of them alive, renewing the operation till no more are to be found.

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Reaumur has given us a very entertaining account of the infinite hosts of Ephemerae that by myriads of millions emerge at a certain season of the year from some of the rivers in France, which, as it is well worth your attention, I shall abridge for you.

These insects in their first and intermediate state are aquatic: they either live in holes in the banks of rivers or brooks below the water, so that it enters into their habitations, which they seldom quit; or they swim

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about and walk upon the bed of the stream, or conceal themselves under stones or upon pieces of stick. Though their life, when they assume the perfect state, is usually extremely short, some being disclosed after sun-set, laying their eggs and dying before sun-rise; and many not living more than three hours; yet in their preparatory state their existence is much longer, in some one, in others two, in others even three years.

The different species assume the imago at different times of the year; but the same species appear regularly at nearly the same period annually, and for a certain number of days fill the air in the neighbourhood of the rivers, emerging also from the water at a certain hour of the day. Those which Swammerdam observed, began to fly about six o'clock in the evening, or about two hours before sun-set; but the great body of those noticed by Reaumur did not appear till after that time; so that the season of different harvests is not better known to the farmer, than that in which the Ephemerae of a particular river are to emerge, is to the fishermen. Yet a greater degree of heat or cold, the rise or fall of the water, and other circumstances we are not aware of, may accelerate or retard their appearance. Between the 10th and 15th of August is the time when those of the Seine and Marne, which Reaumur described, are expected by the fishermen, who call them *manna*: and when their season is come, they say "the manna begins to appear, the manna fell abundantly such a night;"—alluding, by this expression, either to the astonishing quantity of food which the Ephemerae afford the fish, or to the large quantity of fish which they then take.

Reaumur first observed these insects in the year 1738,

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when they did not begin to show themselves in numbers till the 18th of August. On the 19th, having received notice from his fisherman that the flies had appeared, he got into his boat about three hours before sun-set,

and detached from the banks of the river several masses of earth filled with pupæ, which he put into a large tub full of water. This tub, after staying in the boat till about eight o'clock without seeing any remarkable number of the flies, and being threatened with a storm, he caused to be landed and placed in his garden, at the foot of which ran the Marne. Before the people had landed it, an astonishing number of Ephemera emerged from it. Every piece of earth that was above the surface of the water was covered by them, some beginning to quit their slough, others prepared to fly, and others already on the wing; and every where under the water they were to be seen in a greater or less degree of forwardness. The storm coming on, he was obliged to quit the amusing scene; but when the rain ceased to fall he returned to it. As soon as the cloth with which he had ordered the tub to be covered was removed, the number of flies appeared to be greatly augmented, and kept continually increasing: many flew away, but more were drowned. Those already transformed, and continually transforming, would have been sufficient of themselves to have made the tub seem full; but their number was soon very much enlarged by others attracted by the light. To prevent their being drowned, he caused the tub to be again covered with the cloth, and over it he held the light, which was soon concealed by a layer of these flies, that might have been taken by handfulls from the candlestick.

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Of this order also is the bee-cuckoo (*Cuculus Indicator*) so celebrated for its instinct, by which it serves as a guide to the wild bees' nests in Africa. Sparrman describes this bird, which is somewhat larger than a common sparrow, as giving this information in a singular manner. In the evening and morning, which are its meal times, it excites the attention of the Hottentots, colonists, and honey-ratel, by the cry of *cherr, cherr, cherr*, and conducts them to the tree or spot in which the bees' nest is concealed, continually repeating this cry. When arrived at the spot, it hovers over it, and then alighting on some neighbouring tree or bush, sits in silence, expecting to come in for its share of the spoil, which is that part of the comb containing the brood.

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One of the species that has probably been attended to ages before our hive-bee, is *Apis fasciata* of Latreille, a kind so extensively cultivated in Egypt, that Niebuhr states he fell in upon the

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Nile, between Cairo and Damietta, with a convoy of 4000 hives, which were transporting from a region where the season for flowers had passed, to one where the spring was later. Columella says that the Greeks in like manner sent their bee-hives every year from Achaia into Attica; and a similar custom is not unknown in Italy, and even in this country in the neighbourhood of heaths.

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Some insects in their perfect state, though furnished with organs of feeding, make no use of them, and consume no food whatever. Of this description are the moth which proceeds from the silk-worm, and several others of the same order; the different species of *Cæstrus*, and the Ephemera, insects whose history is so well known as to afford a moral or a simile to those most ignorant of natural history. All these live so short a time in the perfect state as to need no food.—Indeed it may be laid down as a general rule, that almost all insects in this state eat much less than in that of larvæ. The voracious caterpillar when transformed into a butterfly needs only a small quantity of honey; and the gluttonous maggot, when become a fly, contents itself with a drop or two of any sweet liquid.

While in the state of larvæ the quantity of food consumed by insects is vastly greater in proportion to their bulk than that required by larger animals. Many caterpillars eat daily twice their weight of leaves, which is as if an ox, weighing sixty stone, were to devour every twenty-four hours three quarters of a ton of grass

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The Rev. R. Sheppard has often noticed in the fen ditches of Norfolk a very large spider which actually forms a raft for the purpose of obtaining its prey with more facility. Keeping its station upon a ball of weeds about three inches in diameter, probably held together by slight silken cords, it is wafted along the surface of the water upon this floating island, which it quits the moment it sees a drowning insect—not, as you may conceive, for the sake of applying to it the process of the Humane Society, but of hastening its exit by a more speedy engine of destruction. The booty thus seized it devours at leisure upon its raft, under which it retires when alarmed by any danger.

The last of the tribe of hunters that it is necessary to particularize, are those which, like the tigers amongst the larger animals, seize their victims by leaping upon them. To this division belongs a very pretty small banded species, *A. scenica*, which in summer may be seen running on every wall.

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VOL. II.

LONDON:

PRINTED FOR LONGMAN, HURST, KEES, ORME, AND BROWN,
PATERNOSTER-ROW.

1817.

II, 4

associations formed for the purpose of travelling or emigrating together—associations for feeding together—and associations that undertake some common work.

The first of these associations consists chiefly of insects in their perfect state. The little beetles called whirlwigs (*Gyrinus*, L.),—which may be seen clustering in groups under warm banks in every river and every pool, and wheeling round and round with great velocity; at your approach dispersing and diving under water, but as soon as you retire resuming their accustomed movements,—seem to be under the influence of the social principle, and to form their assemblies for no other purpose but to enjoy together, in the sun-beam, the mazy dance. Impelled by the same feeling, in the very depth of winter, even when the earth is covered with snow, the tribes of *Tipulidæ* (usually, but improperly, called gnats) assemble in sheltered situations at midday, when the sun shines, and form themselves into choirs, that alternately rise and fall with rapid evolutions*. To see these little æry beings apparently so full of joy and life, and feeling the entire force of the social principle in that dreary season, when the whole animal creation appears to suffer, and the rest of the insect tribes are torpid, always conveys to my mind the most agreeable sensations.

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I shall now relate to you some other portions of Myrmidonian History, which, though perhaps not so striking and wonderful as the preceding details, are not devoid of interest, and will serve to exemplify their incredible diligence, labour, and ingenuity.

In this country it is commonly in March, earlier or later according to the season, that ants first make their appearance, and they continue their labours till the middle or latter end of October. They emerge usu-

ally from their subterranean winter-quarters on some sunny day; when, assembling in crowds on the surface of the formicary, they may be observed in continual motion, walking incessantly over it and one another, without departing from home; as if their object, before they resumed their employments, was to habituate themselves to the action of the air and sun^b.

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After their annual labours are begun, few are ignorant how incessantly ants are engaged in building or repairing their habitations, in collecting provisions, and in the care of their young brood; but scarcely any are aware of the extent to which their activity is carried, and that their labours are going on even in the night.—Yet this is a certain fact.—Long ago Aristotle affirmed that ants worked in the night when the moon was at the full^a; and their historian Gould observes, “that they even exceed the painful industrious bees. For the ants employ each moment, by day and night, almost without intermission, unless hindered by excessive rains^b.”

M. Huber also, speaking of a mason-ant, not found with us, tells us that they work after sun-set, and in the night^c. To these I can add some observations of my own, which fully confirm these accounts. My first were made at nine o'clock at night, when I found the inhabitants of a nest of the red ant (*Myrmica rubra*) very busily employed; I repeated the observation, which I could conveniently do, the next being in my garden, at various times from that hour till twelve, and always found some going and coming, even while a heavy rain was falling. Having in the day

^a Hist. Animal. l. ix. c. 38.^b Gould, 68.^c Huber, 35, 42.

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noticed some Aphides upon a thistle, I examined it again in the night, at about eleven o'clock, and found my ants busy milking their cows, which did not for the sake of repose intermit their suction. At the same hour, another night, I observed the little negro ant (*F. fusca*) engaged in the same employment upon an elder. About two miles from my residence was a nest of Gould's hill-ant (*F. rufa*), which, according to M. Huber, shut their gates, or rather barricade them, every night, and remain at home^a. Being desirous of ascertaining the accuracy of his statement, early in October, about two o'clock one morning, I visited this nest, in company with an intelligent friend; and to our surprise and admiration we found our ants at work, some being engaged in carrying their usual burden, sticks and straws, into their habitation, others going out from it, and several were climbing the neighbouring oaks, doubtless to milk their Aphides. The number of comers and goers at that hour, however, was nothing compared with the myriads that may always be seen on these nests during the day. It so happened

that our visit was paid while the moon was near the full; so that whether this species is equally vigilant and active in the absence of that luminary yet remains uncertain. Perhaps this circumstance might reconcile Huber's observation with ours, and confirm the accuracy of Aristotle's statement before quoted. **To the red ant, indeed, it is perfectly indifferent whether the moon shine or not; they are always busy, though not in such numbers as during the day.**

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In ordinary seasons, in the month lately mentioned, October, wasps seem to become less savage and sanguinary; for even flies, of which earlier in the summer they are the pitiless destroyers, may be seen to enter their nests with impunity. It is then, probably, that they begin to be first affected by the approach of the cold season, when nature teaches them it is useless longer to attend to their young. **They themselves all perish, except a few of the females, upon the first attack of frost.**

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The population of a humble-bees nest may be divided into four orders of individuals: the large females; the small females; the males; and the workers.

The large females, like the female wasps, are the original founders of their republics. They are often so large, that by the side of the small ones or the workers, which in every other respect they exactly resemble, they look like giants opposed to pygmies. They are excluded from the pupa in the autumn; and pair, in that season, with males produced from the eggs of the small females. They pass the winter under ground, and, as appears from an observation of M. P. Huber, in a particular apartment, separate from the nest, and rendered warm by a carpeting of moss and grass, but without any supply of food. Early in the spring, (for they make their first appearance as soon as the catkins of the willows and poplars are in flower,) like the female wasps, they lay the foundations of a new colony

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To the same purpose Riem of Lauten of the *Palatinate Apiarian Society*, and Wilhelmi of the *Lusatian*, affirm that the queen lays the eggs which produce the queens and workers; and the workers those that produce the drones or males^b. Aristotle also tells us, that some in his time affirmed that the bees (the workers) were the females, and the drones the males; an opinion which he combats from an analogy pushed rather too far, that nature would never give offensive armour to females^c. **In another place he appears to think that the workers are hermaphrodites:—his words are remarkable, and seem to indicate that he was aware of the sexes of plants: "having in themselves," says he, "like plants, the male and the female"^d.**

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What I have further to say concerning these admirable creatures, will be principally taken from the two authors who have given the clearest and most satisfac-

tory account of them, Reaumur and the elder Huber; though I shall add from other sources such additional observations as may serve better to elucidate their history.

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numerous differences, both as to the form and relative proportion of parts, occur continually. The cause of these differences we cannot always ascertain; yet in many instances they may either be derived from the nutriment which the embryo receives in the womb, or from the greater or less dimensions or higher or lower temperature of that organ—a case that analogically would not be very wide of that of the grub or embryo of a bee inclosed in a cell. Some of the differences in man I now allude to, may often be caused by a particular diet in childhood; a warmer or a colder, a looser or a tighter dress, or the like. **Thus, for instance, the Egyptians, who went bare-headed, had their skulls remarkably thick; while the Persians, who covered the head with a turban or mitre, were distinguished by the tenuity of theirs.** Again, the inhabitants of certain districts are often remarkable peculiarities of form, which are evidently produced by local circumstances.

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The following observations, mostly taken from an essay of the celebrated anatomist John Hunter, in the *Philosophical Transactions*, since they are intimately connected with the subject that we are now considering, will not be here misplaced. In animals just born, or very young, there are no peculiarities of shape, exclusive of the primary distinctions, by which one sex may be known from the other. Thus secondary distinctive characters, such as the beard in men, and the breasts in women, are produced at a certain period of life; and these secondary characters, in some instances, are changed for those of the other sex; which does not arise from any action at the first formation, but takes place when the great command "Increase and multiply" ceases to operate. **Thus women in advanced life are sometimes distinguished by beards; and after they have done laying, hen-birds occasionally assume the plumage of the cock: (this has been observed more than once by ornithologists, more particularly with respect to the pheasant and the pea-hen^a.—For females to assume the secondary characters of males, seems certainly a more violent change, than for a worker bee, which may be regarded as a sterile female, in consequence of a certain process, to assume the secondary characters of a fertile female.**

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You may think, perhaps, that the bees which emigrate from the parent hive are the youth of the colony; **but this is not the case, for bees of all ages unite to form the swarms.** The numbers of which they consist vary much. Reaumur calls 12,000 a moderate swarm; and he mentions one which amounted to more than three times that number (40,000). **A swarm seldom or never takes place except when the sun shines**

It will therefore change the scene a little, if we accompany them in their excursions to collect the various substances of which they have need^b. On these occasions the principal object of the bees is to furnish themselves with three different materials:—the nectar of flowers, from which they elaborate honey and wax;

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the pollen or fertilizing dust of the anthers, of which they make what is called bee-bread, serving as food both to old and young; and the resinous substance called by the ancients *Propolis* and *Pissoceros*, &c. used in various ways in rendering the hive secure and giving the finish to the combs. The first of these substances is the pure fluid secreted in the nectaries of flowers, which the length of their tongue enables them to reach in most blossoms. The tongue of a bee, you are to observe, though so long and sometimes so inflated^a, is not a tube through which the honey passes, nor a pump acting by suction, but a real tongue which laps or licks the honey, and passes it down on its upper surface, as we do, to the mouth, which is at its base concealed by the mandibles^b. It is conveyed by this orifice through the œsophagus into the first stomach, which we call the honey-bag, and which, from being very small, is swelled when full of it to a considerable size. Honey is never found in the second stomach, (which is surrounded with muscular rings, and resembles a cask covered with hoops from one end to the other,) but only in the first: in the latter and the intestines the bee-bread only is discovered. How the wax is secreted, or what vessels are appropriated to that purpose, is not yet ascertained. Huber suspects that a cellular substance, consisting of hexagons, which lines the membrane of the wax-pockets, may be concerned in this operation. This substance he also discovered in humble-bees (which though they make wax have no wax-pockets), occupying all the anterior part or base of the segments^c.

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Long before Linné had discovered the nectary of flowers, our industrious creatures had made themselves intimate with every form and variety of them; and no botanist, even in this enlightened era of botanical science, can compare with a bee in this respect. The station of these reservoirs, even where the armed sight of science cannot discover it, is in a moment detected by the microscopic eye of this animal.

She has to attend to a double task—to collect materials for bee-bread, as well as for honey and wax. Observe a bee that has alighted upon an open flower. The hum produced by the motion of her wings ceases; and her employment begins. In an instant she unfolds her tongue, which before was rolled up under her head. With what rapidity does she dart this organ between the petals and the stamina! At one time she extends it

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to its full length, then she contracts it; she moves it about in all directions, so that it may be applied both

to the concave and convex surface of a petal, and wipe them both; and thus by a virtuous theft robs it of all its nectar. All the while this is going on, she keeps herself in a constant vibratory motion. The object of the industrious animal is not, like the more selfish butterfly, to appropriate this treasure to herself. It goes into the honey-bag as into a laboratory, where it is transformed into pure honey; and when she returns to the hive, she regurgitates it in this form into one of the cells appropriated to that purpose; in order that, after tribute is paid from it to the queen, it may constitute a supply of food for the rest of the community.

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body of the bee is covered with farina, with the brushes of its legs, especially of the hind ones, it wipes it off; not, as we do with our dusty clothes, to dissipate and disperse it in the air, but to collect every particle of it, and then to knead it and form it into two little masses, which she places, one in each, in the baskets formed by hairs^a on her hind legs.

Aristotle says that in each journey from the hive, bees attend only one species of flower^b; Reaumur, however, seems to think that they fly indiscriminately from one to another: but Mr. Dobbs in the *Philosophical Transactions*^c, and Butler before him, asserts that he has frequently followed a bee engaged in collecting pollen, &c. and invariably observed that it continued collecting from the same kind of flowers with which it first began; passing over other species, however numerous, even though the flower it first selected was scarcer than others. His observations, he thinks, are confirmed—and the idea seems not unreasonable—by the uniform colour of the pellets of pollen, and their different size. Reaumur himself tells us that the bees enter the hive, some with yellow pellets, others with red ones, others again with whitish ones, and that sometimes they are even green: upon which he observes, that this arises from their being collected from particular flowers, the pollen of whose anthers is of those colours^d. Sprengel, as before intimated^e, has made an observation similar to that of Dobbs. It seems not improbable that the reason why the bee visits the same species of plants during one excursion may be this:—

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Her instinct teaches her that the grains of pollen that enter into the same mass should be homogeneous, in order perhaps for their more effectual cohesion; and thus Providence also secures two important ends,—the impregnation of those flowers that require such aid, by the bees passing from one to another; and the avoiding the production of hybrid plants, from the application of the pollen of one kind of plant to the stigma of another. When the anthers are not yet burst, the bee opens them with her mandibles, takes a parcel of pollen, which one of the first pair of legs receives and delivers to the middle pair, from which it passes to one of the hind legs.

If the contents of one of the little pellets be examined under a lens, it will be found that the grains have all retained their original shape. A botanist practised in

the figure of the pollen of the different species of common plants might easily ascertain, by such an examination, whether a bee had collected its ambrosia from one or more, and also from what species of flowers.

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You have seen how the bees collect and employ two of the materials that I mentioned; I must now advert to the third—the *Propolis*. Huber was a long time uncertain from whence the bees procured this gummy resin; but it at last occurred to him to plant some cuttings of a species of poplar (before their leaves were developed, when their leaf-buds were swelling, and besmeared and filled with a viscid juice,) in some pots, which he placed in the way of the bees that went from his hives. Almost immediately a bee alighted upon a twig, and soon with its mandibles opened a bud, and drew from it a thread of the viscid matter which it contained; with one of its second pair of legs it took it from the mouth, and placed it in the basket: thus it proceeded till it had given them both their load^b. I have myself seen bees very busy collecting it from the *Tacamahaca* (*Populus balsamifera*, L.). But this is an old discovery, confirmed by recent observation; for Mouffet tells us from Cordus, that it is collected from the gems of trees, instancing the poplar and the birch^c. Riem observes that it is also collected from the pine and fir. The propolis is soft, red, will pull out in a thread, is aromatic, and imparts a gold colour to white, polished metals.

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Mr. Knight mentions an instance of bees using an artificial kind of propolis. He had caused the decorated part of some tree to be covered with a cement composed of bees-wax and turpentine: finding this to their purpose, they attacked it, detaching it from the tree by their mandibles, and then, as usual, passing it from the first leg to the second, and so to the third. When one bee had thus collected its load, another often came behind and despoiled it of all it had collected; a second and third load were frequently lost in the same manner; and yet the patient animal pursued its labours without showing any signs of anger^c.

Bees in their excursions do not confine themselves to the spot immediately contiguous to their dwelling, but, when led by the scent of honey, will go a mile from it. Huber even assigns to them a radius of half a league round their hive for their ordinary excursions; yet from this distance they will discover honey with as much certainty as if it was within their sight. To prove that it is by their scent that bees find it out, he put some behind a window-shutter, in a place where it could not be seen, leaving the shutter just open enough for

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insects, if they liked, to get at it. In less than a quarter of an hour four bees, a butterfly, and some house-flies had discovered it. At another time he put some into boxes, with little apertures in the lid, into which pieces of card were fitted, which he placed about two hundred paces from his hives. In about half an hour the bees discovered them, and traversing them very in-

dustriously, soon found the apertures, when, pushing in the pieces of card, they got to the honey. That contained in the blossom of many plants is quite as much concealed, yet the acuteness of their scent enables them to detect it.

These insects, especially when laden and returning to their nest, fly in a direct line, which saves both time and labour. How they are enabled to do this with such certainty as to make for their own abode without deviation, I must leave to others to explain. Connected with this circumstance, and the acuteness of their smell, is the following curious account, given in the *Philosophical Transactions* for 1721, of the method practised in New England for discovering where the wild hive-bees live in the woods, in order to get their honey. The honey-hunters set a plate containing honey or sugar upon the ground in a clear day. The bees soon discover and attack it: having secured two or three that have filled themselves, the hunter lets one go, which, rising into the air, flies straight to the nest: he then strikes off at right angles with its course a few hundred yards, and letting a second fly, observes its course by his pocket-compass, and the point where the two courses intersect is that where the nest is situated^a.

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How long our little active creatures repose before they take a second excursion I cannot precisely say. In a hive the greatest part of the inhabitants generally appear in repose, lying together, says Reaumur, but this probably for a short time. Huber tells us, that bees may always be observed in a hive with the head and thorax inserted into cells that contain eggs, and sometimes into empty ones; and that they remain in this situation fifteen or twenty minutes so motionless, that did not the dilatation of the segments of the abdomen prove the contrary, they might be mistaken for dead. He supposes their object is repose from their labours^b.

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Reaumur observes, that in a hive the population of which amounts to 18,000, the number that enter the hive in a minute is a hundred; which, allowing fourteen hours in the day for their labour, makes 84,000: thus every individual must make four excursions daily, and some five. In hives where the population was smaller, the numbers that entered were comparatively greater, so as to give six excursions or more to each bee^b. But in this calculation Reaumur does not seem to take into the account those that are employed within the hive in building or feeding the young brood; which must render the excursions of each bee still more numerous. He proceeds further to ground upon this statement a calculation of the quantity of bee-bread that may be collected in one day by such a hive; and he found, supposing only half the number to collect it, that it would amount to more than a pound; so that in one season, one such hive might collect a hundred

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pounds^c. What a wonderful idea does this give of the industry and activity of these little useful creatures!

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The worker bees are annual insects, though the queen will sometimes live more than two years; but, as every swarm consists of old and young, this is no argument for burning them. It is a saying of bee-keepers in Holland, that the first swallow and the first bee foretell each other^b. This perhaps may be correct there; but with us the appearance of bees considerably precedes that of the swallow; for when the early crocuses open, if the weather be warm, they may always be found busy in the blossom.

The time that bees will inhabit the same stations is wonderful. Reaumur mentions a countryman who preserved bees in the same hive for thirty years^c. Thorley tells us that a swarm took possession of a spot under the leads of the study of Ludovicus Vives in Oxford, where they continued a hundred and ten years, from 1520 to 1630^d. These circumstances have led authors to ascribe to bees a greater age than they can claim. Thus Mouffet, because he knew a bees-nest which had remained thirty years in the same quarters, concludes that they are very long-lived, and very sapiently doubts whether they even die of old age at all!!!

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A numerous host of our little animals escape from birds and other assailants by imitating the colour of the plants, or parts of them, which they inhabit; or the twigs of shrubs and trees; their foliage, flowers, and fruit.

The Spectre tribe (*Phasma*, Licht.) go still further in this mimicry, representing a small branch with its spray. I have one from Brazil eight inches long, that, unless it was seen to move, could scarcely be conceived to be any thing else; the legs, as well as the head, having their little snags and knobs, so that no imitation can be more accurate. Perhaps this may be the species mentioned by Molina^c, which the natives of Chili call the "The Devil's Horse."

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Thus the white froth often observable upon rose-bushes, and other shrubs and plants, called by the vulgar frog-spittle,—but which, if examined, will be found to envelop the larva of a small hemipterous insect (*Cicada spumaria*, L.), from whose anus it exudes, although it is sometimes discovered even in this concealment by the indefatigable wasps, and becomes their prey,—serves to protect the insect, which soon dies when exposed, not only from the heat of the sun and from violent rains, but also to hide it from the birds and its other foes.—The cottony secretion that transpires through the skin of many species of *Aphis*, *Chermes*, and *Coccus*, and in which the eggs of the latter are often involved, may perhaps be of use to them in this view; either concealing them—for they look rather like little locks of cotton, or feathers, than any thing animated—or rendering them distasteful to creatures that would otherwise prey upon them. II, 250

The acid of ants has long been celebrated, and is one of their most powerful means of defence. When

the species that have no sting make a wound with their jaws, they insinuate into it some of this acid, which Fontana affirms is the acid of fixed concentrated air deprived of its elasticity and rendered liquid^a. The effluvia produced by this acid are so subtle and penetrating, that it is impossible to hold your head near the nest of the hill-ant (*Formica rufa*, L.), when the ants are much disturbed, without being almost suffocated. This odour thus proceeding from myriads of ants, is powerful enough, it is said, to kill a frog, and is probably the means of securing the nest from the attack of many enemies.—Dr. Arnold observed a species of bug (*Scutellera*, F.) abundant upon some polygamous plant which he could not determine, and in all their different states. They were attended closely by hosts of ants, and when disturbed emitted a very strong smell. One of these insects ejected a minute drop of fluid into one of his eyes, which occasioned for some hours considerable pain and inflammation. In the evening, however, they appeared to subside;—but on the following morning the inflammation was renewed, became worse than ever, and lasted for three days.

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But of all the contrivances by which insects in this state are secured from their enemies, there is none more ingenious than that to which the may-flies (*Phryganea*, L.) have recourse for this purpose. You have heard before that these insects are at first aquatic, and inhabit curious cases made of a variety of materials, which are usually open at each end^b. Since they must reside in these cases, when they are become pupæ, till the time of their final change approaches, if they are left open, how are the animals, now become torpid, to keep out their enemies? Or, if they are wholly closed, how is the water, which is necessary to their respiration and life, to be introduced? These sagacious creatures know how to compass both these ends at once. They fix a grate or portcullis to each extremity of their fortress, which at the same time keeps out intruders and admits the water. These grates they weave with silk spun from their anus into strong threads, which cross each other, and are not soluble in water.

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There is a tribe of minute insects amongst the *Aptera*, found often under bark, sometimes in the water, and in various other situations, which Linné has named *Podura*, a term implying that they have a leg in their tail. This is literally the fact. For the tail, or anal extremity, of these insects is furnished with an inflexed fork^b, which, though usually bent under the body, they have the power of unbending; during which action, the forked spring, pushing powerfully against the plane of position, enables the animal to leap sometimes two or three inches. What is more remarkable, these little animals are by this organ even empowered to leap upon water. There is a minute black species (*P. aquatica*, L.) which in the spring is often seen floating on that contained in ruts, hollows, or even ditches, and in such

infinite numbers as to resemble gunpowder strewed upon the surface.

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I dare say you are anxious to be told how any animals can fly *without wings*, and wish me to begin with them. As an observer of nature, you have often, without doubt, been astonished by that sight occasionally noticed in fine days in the autumn, of webs—commonly called gossamer webs—covering the earth and, floating in the air; and have frequently asked yourself—What are these gossamer webs? Your question has from old times much excited the attention of learned naturalists. It was an old and strange notion that these webs were composed of dew burned by the sun.

".....The fine nets which oft we woven see
Of scorched dew,"

says Spenser. Another, fellow to it, and equally absurd, was that adopted by a learned man and good natural philosopher, and one of the first fellows of the Royal Society, Robert Hooke, the author of *Micrographia*. "Much resembling a cobweb," says he, "or a confused lock of these cylinders, is a certain white

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substance which, after a fog, may be observed to fly up and down the air: catching several of these, and examining them with my microscope, I found them to be much of the same form, looking most like to a flake of worsted prepared to be spun; though by what means they should be generated or produced is not easily imagined: they were of the same weight, or very little heavier than the air; and 'tis not unlikely, but that those great white clouds, that appear all the summer time, may be of the same substance^a." So liable are even the wisest men to error when, leaving fact and experiment, they follow the guidance of fancy. Some French naturalists have supposed that these *Fils de la Vierge*, as they are called in France, are composed of the cottony matter in which the eggs of the Coccus of the vine (*C. Vitis*, L.) are enveloped^b. In a country abounding in vineyards this supposition would not be absurd; but in one like Britain, in which the vine is confined to the fruit-garden, and the Coccus seldom seen out of the conservatory, it will not at all account for the phenomenon.—What will you say, if I tell you that these webs (at least many of them) are air-balloons—and that the aeronauts are not

"Lovers who may bestride the gossamer
That idles in the wanton summer air,
And yet not fall"—

but spiders, who long before Montgolfier, nay, ever since

^a *Microgr.* 202. It has been objected to an excellent primitive writer (*Clemens Romanus*), that he believed the absurd fable of the phoenix. But surely this may be allowed for in him, who was no naturalist, when a scientific natural philosopher could believe that the clouds are made of solid web!

^b Latreille, *Hist. Nat.* xix, 388.

the creation, have been in the habit of sailing through the fields of ether in these air-light chariots! This seems to have been suspected long ago by Henry Moore, who says,

"As light and thin as cobwebs that do fly
In the blew air, caus'd by the autumnal sun,
That boils the dew that on the earth doth lie,
May seem this whitish rug then is the scum;
Unless that wiser men make't the field-spider's loom^a."

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The rapidity with which the spider vanishes from the sight upon this occasion and darts into the air, is a problem of no easy solution. Can the length of web that they dart forth counterpoise the weight of their bodies? Or have they any organ analogous to the natatory vesicles of fishes^a, which contributes at their will to render them buoyant in the air? Or do they rapidly ascend their threads in their usual way, and gather them up, till having collected them into a mass of sufficient magnitude, they give themselves to the air, and are carried here and there in these chariots? I must here give you Mr. White's very curious

^a *Cuvier, Anat. Comp.* i. 501.

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account of a shower of these webs that he witnessed.

On the 21st of September 1741, intent upon field-diversions, he rose before day-break; but on going out, he found the whole face of the country covered with a thick coat of cobweb drenched with dew, as if two or three setting-nets had been drawn one over the other. When his dogs attempted to hunt, their eyes were so blinded and hood-winked that they were obliged to lie down and scrape themselves. This appearance was followed by a most lovely day. About nine A.M. a shower of these webs (formed not of single floating threads, but of perfect flakes, some near an inch broad, and five or six long,) was observed falling from very elevated regions, which continued without interruption during the whole of the day;—and they fell with a velocity which showed that they were considerably heavier than the atmosphere. When the most elevated station in the country where this was observed was ascended, the webs were still to be seen descending from above, and twinkling like stars in the sun, so as to draw the attention of the most incurious. The flakes of the web on this occasion hung so thick upon the hedges and trees, that baskets-full might have been collected. No one doubts, he observes, but that these webs are the production of small spiders, which swarm in the fields in fine weather in autumn, and have a power of shooting out webs from their tails, so as to render themselves buoyant and lighter than the air^a.

In Germany these flights of gossamer appear so constantly in autumn, that they are there metaphorically called "*Der fliegende Sommer*" (the flying or departing summer);

Amongst the *Neuropterous* tribes the most conspicuous insects are the dragon-flies (*Libellulidæ*), which—their metamorphosis, habits, mode of life, and characters considered—form a distinct natural order of themselves. Their four wings, which are nearly equal in size, are a complete and beautiful piece of net-work, resembling the finest lace, the meshes of which are usually filled by a pure, transparent, glassy membrane. In two of the genera belonging to this tribe, the wings, when the animal is at rest, are always expanded, so that they can take flight in an instant, no previous unfolding of these organs being necessary. In *Agrion*, the other genus of the tribe, the wings when they repose are not expanded. I have observed of these insects, and also of several others in different orders, that (without turning they can fly in all directions—backwards, and to the right and left, as well as forwards. This ability to fly all ways, without having to turn, must be very useful to them when pursued by a bird. Leeuwenhoek once saw a swallow chasing an insect of this tribe, which he calls a *Mordella*, in a menagerie about a hundred feet long.) The little creature flew with such astonishing velocity—to the right—to the left—and in all directions—that this bird of rapid wing and ready evolution was unable to overtake and entrap it; the insect eluding every attempt, and being generally six feet before it^a. Indeed, such is the power of the long wings by which the dragon-flies are

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distinguished, particularly in *Aeshna* and *Libellula*, and such the force of the muscles that move them, that they seem never to be wearied with flying. I have observed one of the former genus sailing for hours over a piece of water—sometimes to and fro, and sometimes wheeling from side to side; and all the while chasing, capturing, and devouring the various insects that came athwart its course, or driving away its competitors—without ever seeming tired, or inclined to alight.

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Reaumur describes in a very interesting and lively way the gyrations of the *Ephemæ* before noticed^a, round a lighted flambeau. It is singular, says he, that moths which fly only in the night, and shun the day, should be precisely those that come to seek the light in our apartments. It is still more extraordinary that these *Ephemæ*—which appearing after sun-set, and dying before sun-rise, are destined never to behold the light of that orb—should have so strong an inclination for any luminous object. To hold a flambeau when they appeared was no very pleasant office; for he who filled it, in a few seconds had his dress covered with the insects, which rushed from all quarters to him. The light of the flambeau exhibited a spectacle which enchanted every one that beheld it. All that were present, even the most ignorant and stupid of his domestics, were never satisfied with looking at it. Never had any armillary sphere so many zones, as there were here circles, which had the light for their centre. There

was an infinity of them—crossing each other in all directions, and of every imaginable inclination—all of which were more or less eccentric.

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It is remarkable that the smaller *Tipulidæ* will fly unwetted in a heavy shower of rain, as I have often

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observed. How keen must be their sight, and how rapid their motions, to enable them to steer between drops bigger than their own bodies, which, if they fell upon them, must dash them to the ground!

Amidst this infinite variety of motions, for purposes so numerous and diversified, and performed by such a multiplicity of instruments and organs, who does not discern and adore the Great FIRST MOVER?

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LUMINOUS INSECTS.

Of the insects thus singularly provided, the common glow-worm (*Lampyrus noctiluca*) is the most familiar instance. Who that has ever enjoyed the luxury of a summer evening's walk in the country, in the southern parts of our island, but has viewed with admiration these "stars of the earth and diamonds of the night?" And if, living like me in a district where it is rarely met with, the first time you saw this insect, chanced to be, as it was in my case, one of those delightful evenings which an English summer seldom yields, when not a breeze disturbs the balmy-air, and "every sense is joy," and hundreds of these radiant worms, studding their mossy couch with mild effulgence, were presented to your wondering eye in the course of a quarter of a mile,—you could not help associating with the name of glow-worm the most pleasing recollections. No wonder that an insect, which chiefly exhibits itself on occasions so interesting, and whose economy is so remarkable, should have afforded exquisite images and illustrations to those poets who have cultivated Natural History.

If you take one of these glow-worms home with you for examination, you will find that in shape it somewhat resembles a caterpillar, only that it is much more depressed; and you will observe that the light proceeds from a pale-coloured patch that terminates the underside of the abdomen. It is not, however, the larva of an insect, but the perfect female of a winged beetle, from which it is altogether so different, that nothing but actual observation could have inferred the

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fact of their being the sexes of the same insect. In the course of our inquiries you will find that sexual differences even more extraordinary exist in the insect world.

It has been supposed by many that the males of the different species of *Lampyrus* do not possess the property of giving out any light; but it is now ascertained that this supposition is inaccurate, though their light is much less vivid than that of the female. Ray first

pointed out this fact with respect to *L. noctiluca*^a. Geoffroy also observed that the male of this species has four small luminous points, two on each of the two last segments of the belly^b: and his observation has been recently confirmed by Müller. This last entomologist, indeed, saw only two shining spots; but from the insect's having the power of withdrawing them out of sight so that not the smallest trace of light remains, he thinks it is not improbable that at times two other points still smaller may be exhibited, as Geoffroy has described. In the males of *L. Splendidula* and of *L. hemiptera* the light is very distinct, and may be seen in the former while flying^c. The females have the same faculty of extinguishing or concealing their light—a very necessary provision to guard them from the attacks of the nightingale and other nocturnal birds; Mr. White even thinks that they regularly put it out between eleven and twelve every night^d: and they have also the power of rendering it for a while more vivid than ordinary.

^a Hist. Ins. 81.^b Hist. abreg. i. 168.^c Illiger Mag. iv. 195.^d Nat. Hist. ii. 279.

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Besides the different species of the genus *Lampyris*, all of which are probably more or less luminous, another insect of the beetle tribe, *Elater noctilucus*, is endowed with the same property, and that in a much higher degree. This insect, which is an inch long and about one-third of an inch broad, gives out its principal light from two transparent eye-like tubercles placed upon the thorax; but there are also two luminous patches concealed under the elytra, which are not visible except when the insect is flying, at which time it appears adorned with four brilliant gems of the most beautiful golden-blue lustre: in fact, the whole body is full of light, which shines out between the abdominal segments when stretched. The light emitted by the two thoracic tubercles alone is so considerable, that the smallest print may be read by moving one of these insects along the lines: and in the West India islands, particularly in St. Domingo, where they are very common, the natives were formerly accustomed to employ these living lamps, which they called *Cucuij*, instead of candles in performing their evening household occupations. In travelling at night they used to tie one to each great toe; and in fishing and hunting required no

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other flambeau^a.—Southey has happily introduced this insect in his "*Madoc*" as furnishing the lamp by which Coatel rescued the British hero from the hands of the Mexican priests.

"She beckoned and descended, and drew out
From underneath her vest a cage, or net
It rather might be called, so fine the twigs
Which knit it, where, confined, two Fire-flies gave
Their lustre. By that light did Madoc first
Behold the features of his lovely guide."

Pietro Martire tells us that the *Cucuij* serve the natives

of the Spanish West-India islands not only instead of candles, but as extirpators of the gnats, which are a dreadful pest to the inhabitants of the low grounds. They introduce a few fire-flies, to which the gnats are a grateful food, into their houses, and by means of these "commodious hunters" are soon rid of the intruders. "How they are a remedy," says this author, "for so great a mischief it is a pleasant thing to hear. Hee who understandeth he hath those troublesome guests (the gnattes) at home, diligently hunteth after the Cucuij. Whoso wanteth Cucuij goeth out of the house in the first twilight of the night, carrying a burning fire-brand in his hand, and ascendeth the next hillock that the Cucuij may see it, and hee swingeth the fire-brand about, calling Cucuius aloud, and beateth the ayre with often calling out *Cucui*, *Cucui*?"

^a Pietro Martire, *The Decades of the New World*, quoted in *Madoc* p. 543.

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This singular fact, while it renders it probable that some insects are luminous which no one has imagined to be so; seems to afford a clue to the partial explanation, at least, of the very obscure subject of *ignis fatuus*, and to show that there is considerable ground for the opinion long ago maintained by Ray and Willughby, that the majority of these supposed meteors are no other than luminous insects.

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HYBERNATION OF INSECTS.

the coincidence between the period of the hatching in spring of eggs deposited before winter, and of the leafing of the trees upon which they have been fixed, and on whose foliage the larvæ are to feed: which two events, requiring exactly the same temperature, are always simultaneous. Of this fact I have had a striking exemplification the last spring (1816). On the 20th of February, observing the twigs of the birches in the Hull Botanic Garden to be thickly set, especially about the buds, with minute oval black eggs of some insect with which I was unacquainted, I brought home a small branch and set it in my study, in which is a fire daily, to watch their exclusion. On the 28th of March I observed that a numerous brood of Aphides (not *A. Betulae*, as the wings were without the dark bands of that species) had been hatched from them, and that two or three of the lower buds had expanded into leaves, upon the sap of which they were greedily feasting. This was full a month before either a leaf of the birch appeared, or the egg of an Aphis was disclosed in the open air. To view the relation of which I am speaking with due admiration, you must bear in mind the extremely different periods at which many trees acquire their leaves, and the consequent difference demanded in the constitution of the eggs which hibernate upon dissimilar species, to ensure their exclusion, though acted upon by the same temperature, earlier or later, according to the early or late foliation of these species. There is no visible difference between the conformation of the eggs of the Aphis of the birch and



those of the *Aphis* of the ash; yet in the same exposure those of the former shall be hatched, simultaneously with the expansion of the leaves, nearly a month earlier than those of the latter: thus demonstrably proving that the hybernation of these eggs is not accidental, but has been specially ordained by the Author of nature, who has conferred on those of each species a peculiar and appropriate organization.

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HYBERNATION OF INSECTS.

The first cold weather, after insects have entered their winter quarters, produces effects upon them similar to those which occur in the dormouse, hedgehog, and others of the larger animals subject to torpor. At first a partial benumbing takes place; but the insect if touched is still capable of moving its organs. But as the cold increases all the animal functions cease. The insect breathes no longer, and has no need of a supply of air^c; its nutritive secretions cease, and no more food is required; the muscles lose their irritability^d; and it has all the external symptoms of death. In this state it continues during the existence of great cold, but the degree of its torpidity varies with the temperature of the atmosphere. The recurrence of a mild day, such as we sometimes have in winter, infuses a partial animation into the stiffened animal: if disturbed, its limbs and antennæ resume their power of extension, and even the faculty of spirting out their defensive fluid is re-acquired by many beetles^e. But

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however mild the atmosphere in winter, the great bulk of hybernating insects, as if conscious of the deceptions nature of their pleasurable feelings, and that no food could then be procured, never quit their quarters, but quietly wait for a renewal of their insensibility by a fresh accession of cold.

On this head I have had an opportunity of making some observations which, in the paucity of recorded facts on the hybernation of insects, you may not be sorry to have laid before you. The second of December 1816 was even finer than many of the preceding days of the season, which so happily falsified the predictions that the unprecedented dismal summer would be followed by a severe winter.

The thermometer was 46° in the shade; not a breath of air was stirring; and a bright sun imparted animation to troops of the winter gnat (*Trichocera hiemalis*, Meig.), which frisked under every bush; to numerous *Psychodæ*; and even to the flesh-fly, of which two or three individuals buzzed past me while digging in my garden. Yet though these insects, which I shall shortly advert to as exceptions to the general rule, were thus active, the heat was not sufficient to induce their hybernating brethren to quit their retreats.

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All insects, however, do not undergo this degree of

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torpidity. In fact, there are some, though but few, which cannot, at least in our climate, strictly be said to hybernate, understanding by that term passing the win-

ter in one selected situation in a greater or less degree of torpor, without food.

Amongst perfect insects, troops of *Trichocera hiemalis*, the gnat whose choral dances have been before described^c, may be constantly seen gamboling in the air in the depth of winter when it is mild and calm, accompanied by the little *Psychoda*, so common in windows, several *Muscidæ*, spiders, and occasionally some *Aphodii* and *Staphylinidæ*: and the societies of ants, as well as their attendant Aphides, are in motion and take more or less food during the whole of that season when the cold is not intense.

II, 446

Lastly, there are some few insects which do not seem ever to be torpid, as *Podura nivalis*, L., which runs with agility on the snow itself; and the common hive-bee; though with regard to the precise state in which this last passes the winter, this part of its economy has not been made the subject of such accurate investigation as is desirable.

II, 452

But though many larvæ and pupæ are able to resist a great degree of cold, when it increases to a certain extent they yield to its intensity, and become solid masses of ice. In this state we should think it impossible that they should ever revive. That an animal whose juices, muscles, and whole body have been subjected to a process which splits bombshells, and converted into an icy mass that may be snapped asunder like a piece of glass, should ever recover its vital powers, seems at first view little less than a miracle; and, if the reviviscency of the wheel animal (*Vorticella rotatoria*) and of snails, &c. after years of desiccation, had not made us familiar with similar prodigies, might have been pronounced impossible; and it is probable that many insects when thus frozen never do revive. Of the fact, however, as to several species, there is no doubt. It was first noticed by Lister, who relates that

II, 453

he had found caterpillars so frozen, that when dropped into a glass they chinked like stones, which nevertheless revived^a. Reaumur, indeed, repeated this experiment without success; and found that when the larvæ of *Bombyx Pityocampa*, F. were frozen into ice by a cold of 15° R. below zero (2° F. below zero), they could not be made to revive^b. But other trials have fully confirmed Lister's observations. My friend Mr. Stickney, before mentioned as the author of a valuable *Essay on the Grub* (larva of *Tipula oleracea*)—to ascertain the effect of cold in destroying this insect, exposed some of them to a severe frost, which congealed them into perfect masses of ice. When broken, their whole interior was found to be frozen. Yet several of these resumed their active powers. Bonnet had precisely the same result with the pupæ of *Papilio Brassicæ*; which, by exposing to a frost of 14° R. below zero (0° F.), became lumps of ice, and yet produced butterflies^c. Indeed, the circumstance that animals of a much more complex organization than insects, namely ser-

pents and fishes, have been known to revive after being frozen, is sufficient to dispel any doubts on this head.

John Hunter, though himself unsuccessful in his attempts to reanimate carp and other animals that had been frozen, confesses that the fact itself is so well authenticated as to admit of no question^a.

II, 456

Thus in the early spring of 1805 (to me a memorable one, since in it I began my entomological career, and had anxiously watched its first approach in order to study practically the science of which I had gained some theoretical knowledge in the winter,) insects were generally out by the middle of March; and before the 30th, I find, on referring to my entomological journal, that I had taken and investigated (I scarcely need add, not always with a correct result) fifty-eight coleopterous species: while in the last untoward spring (1816) I did not observe even a bee abroad until the 20th of April; and the first butterfly that I saw did not appear until the 26th.

There are, however, circumstances connected with this revival, which seem to prove that something more than the mere sensation of warmth is concerned in causing it. I shall not insist upon the remarkable fact which Spallanzani has noticed, that insects reappear in spring at a temperature considerably lower than that at which they retired in autumn; because it may be plausibly enough explained by reference to their increased irritability in spring, the result of so long an abstinence from food, and their consequent augmented sensibility to the stimulus of heat. But if the mere perception of warmth were the sole cause of insects relaxing from a state of torpidity, then we might fairly infer, that species of apparently similar organization, and placed in similar circumstances, would leave their winter quarters at the same time. This, however, is far from being the case.

II, 474

INSTINCT OF INSECTS.

It is the instinct of *Scarabæus vernalis* to roll up pellets of dung, in each of which it deposits one of its eggs; and in places where it meets with cow- or horse-dung only, it is constantly under the necessity of having recourse to this process. But in districts where sheep are kept, it wisely saves its labour, and ingeniously

II, 475

avails itself of the pellet-shaped balls ready made to its hands which the excrement of these animals supplies^a.

II, 500-501

It is clearly a distinct instinct which inspires bees with such dread of rain, that even if a cloud pass before the sun, they return to the hive in the greatest haste^a; and that seems to me not less so, which teaches them to find their way back to their home after the most distant and intricate wanderings. When bees have found the direction in which their hive lies, Huber says they fly to it with an extreme rapidity, and as straight as a ball from a musket^b; and if their hives were always in open situations, one might suppose, as Huber seems inclined to think,

that it is by their sight they are conducted to them. But hives are frequently found in small gardens embowered in wood, and in the midst of villages, surrounded and interspersed with trees and buildings, so as to make it impossible that they can be seen from a distance.

II, 526-527

This recognition of home seems clearly the result of memory; and it is remarkable that bees appear to recollect their own hive rather from its situation, than from any observations on the hive itself^c; just as a man is guided to his house from his memory of its position relative to other buildings or objects, without its being necessary for him even to cast a look at it. If, after quitting my house in a morning, it were to be lifted out of its site in the street by enchantment, and replaced by another with a similar entrance, I should probably, even in the day time, enter it, without being struck by the change; and bees, if during their absence their old hive be taken away and a similar one set in its place, enter this last, and if it be provided with brood comb contentedly take up their abode in it, never troubling themselves to inquire what has become of the identical habitation which they left in the morning, and with the inhabitants of which, if it be removed to fifty paces distance, they never resume their connexion^d.

If, pursuing my illustration, you should object that no man would thus contentedly sit down in a new house without searching after the old one, you must bear in mind that I am not aiming to show that bees have as precise a memory as ours, but only that they are endowed with some portion of this faculty, which I think the above fact proves. Should you view it in a different light, you will not deny the force of others that have already been stated in the course of our correspondence; such as the mutual greetings of ants of the same society when brought together after a separation of four months^e; and the return of a party of bees

^a If a hive be removed out of its ordinary position, the first day after this removal, the bees do not fly to a distance without having visited all

the neighbouring objects. The queen does the same thing when flying into the air for fecundation. Huber, *Recherches sur les Fourmis*, 100.



THE

JOURNAL

OF A

NATURALIST.

[John Leonard Knapp]

— "Plants, trees, and stones, we note,
Birds, insects, beasts, and many rural things."

Philadelphia:
CAREY & LEA—CHESTNUT STREET.
1831.

USES OF THE TEASEL.

39

I believe that the teasel affords a solitary instance of a natural production being applied to mechanical purposes in the state in which it is produced.* It appears, from many attempts, that the object designed to be effected by the teasel cannot be supplied by any contrivance—successive inventions having been abandoned as defective or injurious. The use of the teasel is to draw out the ends of the wool from the manufactured cloth, so as to bring a regular pile or nap upon the surface, free from twistings and knottings, and to comb off the coarse and loose parts of the wool.

* *Equisetum hyemale*, the Dutch rush, or shave grass, is yet used in its natural state for finishing fine models in wood, and in removing roughness in plaster casts.

40

BAD CUSTOM IN FARMING.

This picking of the field was formerly very generally resorted to in the midland counties; but the farmers at that time had a sufficient excuse in the scarcity of com-

mon fuel. The droppings of the cows were collected in heaps, and beaten into a mass with water; then pressed by the feet into moulds like bricks, by regular professional persons, called clatters (clodders); then dried in the sun, and stacked like peat, and a dry March for the clat-harvest was considered as very desirable. These answered very well for heating water for the dairy and uses of the farm back-kitchen, giving a steady, dull heat, without flame; but navigable canals, and other

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conveniences of a similar nature, have rendered the practice now unnecessary. With us this bad custom is declining, and probably in time will cease altogether.

[Page 45 has the reference to Oak-Bark.]

TREES ATTRACTORS OF HUMIDITY.

49

ascending a hill in the month of March. The weather had previously been very fine and dry, and the road in a dusty state; but a fog coming on, an ash tree hanging over the road was dripping with water so copiously, that the road beneath was in a puddle, when the other parts continued dry, and manifested no appearance of humidity. That leaves imbibe moisture by one set of vessels and discharge them by another, is well-known; but these imbibings are never discharged in falling drops: the real mystery was, the fog in its progress was impeded by the boughs of the tree, and gradually collected on the exposed side of them, until it became drops of water, whereas the surrounding country had only a mist flying over it. Thus in fact the tree was no attractor, but a condenser; the gate of a field will in the same manner run down with water on the one side, and be dry on the other; as will a stick, or a post, from the same cause. It is upon this principle that currents of air will be found under trees in summer, when little is perceived in open places; and the under leaves and sprays will be curled and scorched at times, when the parts above are uninjured. The air in its passage being stopped and condensed against the foliage of the tree, it accordingly descends along its surface or front, and escapes at the bottom, where there are no branches or leaves to interrupt its progress. In winter there is little to impede the breeze in its course, and it passes through; consequently at this season the air under a tree is scarcely more sensibly felt than in the adjoining field.

It may be observed, that in the spring of the year the herbage under trees is generally more vivid and luxuriant, than that which is beyond the spread of the branches: this may be occasioned, in some instances, by cattle having harbored there, and the ground becoming in consequence more manured; but it will be found likewise manifestly verdant and flourishing where no such accessory could have enriched it, and is, I apprehend, in general, chiefly owing to the effects of the driving fogs and mists, which cause a frequent drip beneath the tree, not experienced in other places, and

62

THE DOGSBANE.

But we have one plant in our gardens, a native of North America, than which none can be more cruelly destruc-

tive of animal life, the dogbane (apocynum androsaemifolium), which is generally conducive to the death of every fly that settles upon it. Allured by the honey on the nectary of the expanded blossom, the instant the trunk is protruded to feed on it, the filaments close, and, catching the fly by the extremity of its proboscis, detain the poor prisoner writhing in protracted struggles till released by death, a death apparently occasioned by exhaustion alone; the filaments then relax, and the body falls to the ground. The plant will at times be dusky from the numbers of imprisoned wretches. This elastic action of the filaments may be conducive to the fertilizing of the seed by scattering the pollen from the anthers, as is the case with the berberry; but we are not sensible that the destruction of the creatures which excite the action is in any way essential to the wants or perfection of the plant, and our ignorance favors the idea of a wanton cruelty in the herb; but how little of the causes and motives of action of created things do we know! and it must be unlimitable arrogance alone that could question the wisdom of the mechanism of him "that judgeth rightly;" the operations of a simple plant confound and humble us, and, like the hand-writing on the wall, though seen by many, can be explained but by ONE.

142

THE RED-START.

(We have no bird more assiduous in attentions to their young, than the red-start, (*steort*, Saxon, a tail,) one or other of the parents being in perpetual action, conveying food to the nest, or retiring in search of it; but as they are active, quick-sighted creatures, they seem to have constant success in their transits. They are the most restless and suspicious of birds during this season of hatching and rearing their young; for when the female is sitting, her mate attentively watches over her safety, giving immediate notice of the approach of any seemingly hostile thing, by a constant repetition of one or two querulous notes, monitory to her or menacing to the intruder: but when the young are hatched, the very appearance of any suspicious creature sets the parents into an agony of agitation, and perching upon some dead branch or a post, they persevere in one unceasing clamor till the object of their fears is removed;

THE KITE.

159

I can confusedly remember a very extraordinary capture of these birds, when I was a boy. Roosting one winter evening on some very lofty elms, a fog came on during the night, which froze early in the morning, and fastened the feet of the poor kites so firmly to the boughs, that some adventurous youths brought down, I think, fifteen of them so secured! Singular as the capture was, the assemblage of so large a number was not less so, it being in general a solitary bird, or associating only in pairs.

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VOICES OF BIRDS.

We note birds in general more from their voices than their plumage; for the carols of spring may be heard involuntarily, but to observe the form and decoration of these creatures, requires an attention not always given. Yet we have some native birds beautifully and conspicuously feathered; the goldfinch, the chaffinch, the wagtails, are all eminently adorned, and the fine

gradations of sober browns in several others are very pleasing. Those sweet sounds, called the song of birds, proceed only from the male; and, with a few exceptions, only during the season of incubation. Hence the comparative quietness of our summer months, when this care is over, except from accidental causes, where a second nest is formed; few of our birds bringing up more than one brood in the season. The redbreast, blackbird, and thrush, in mild winters will continually be heard, and form exceptions to the general procedure of our British birds; and we have one little bird, the woodlark (*alunda arborea*), that in the early parts of the autumnal months delights us with its harmony, and its carols may be heard in the air commonly during the calm sunny mornings of this season.

THE GLOW-WORM.

207

Glow-worms emit light only for a short period in the year; and I have but partially observed it after the middle of July. I have collected many of these pretty creatures on a bank before my house, into which they retire during the winter, to shine out again when revived by the summer's warmth; but in this latter season, I have frequently missed certain of my little protégés, and have reason to apprehend that they formed the banquet of a toad, that frequented the same situation.

Observing above, that the glow-worm does not emit light after the 14th of July, I mean thereby that clear, steady light, which has rendered this creature so remarkable to all persons; for I have repeatedly noticed, deep in the herbage, a faint evanescent light proceeding from these creatures, even as late as August and September. This was particularly manifested September the 28th, 1826. The evening was warm and dewy, and we observed on the house-bank multitudes of these small evanescent sparks in the grass.

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EGGS OF THE SNAKE.

My laborer this day, July the 18th, in turning over some manure, laid open a mass of snake's eggs (*coluber natrix*), fifteen only, and they must have been recently deposited, the manure having very lately been placed where they were found. They were larger than the eggs of a sparrow, obtuse at each end, of a very pale yellow color, feeling tough and soft like little bags of some gelatinous substance. The interior part consisted of a glareous matter like that of the hen, enveloping the young snake, imperfect, yet the eyes and form sufficiently defined. (Snakes must protrude their eggs singly,

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but probably all at one time, as they preserve no regular disposition of them, but place them in a promiscuous heap. At the time of protrusion they appear to be surrounded with a clammy substance, which, drying in the air, leaves the mass of eggs united wherever they touch each other. I have heard of forty eggs being found in these deposits; yet, notwithstanding such provision for multitudes, the snake, generally speaking, is not a very common animal. The kite, the buzzard, and the raven, which prey on it occasionally, are too seldom found greatly to reduce the race; and its deep retirement in the winter seems to secure it from fatal injuries by the severity of the weather: yet in the warm days of spring,

when it awakens from its torpidity and basks upon our sunny banks, the numbers that appear are not proportionate to what might be expected from the number of eggs produced. Few creatures can assail it in its dormitory, yet its paucity proves that it is not exempt from mortality and loss.

THE COMMON NEWTS.

215

Water, in a state of rest over decayed and putrescent vegetable matter, is peculiarly favorable for the residence of many of the insect world. The eggs that are lodged there remain undisturbed by the agitation of the element, and the young produced from them, or deposited there by viviparous creatures, remain in quiet, tolerably secure from accidental injuries; but there are natural causes which render these apparent asylums the fields of ravenousness and of death. To these places resort many of those voracious insects and other creatures, which prey upon the smaller and helpless; for all created things seem subordinate to some more powerful or irresistible agent, from the hardly visible atom that floats in the pool, to man, who claims and commands the earth as his own. But we have no animal that seems to commit greater destruction in these places than the common newt (*Iacertus aquaticus*). In some of these well-stored magazines this reptile will grow to a large size, and become unusually warty, and bloated with repletion; feeding and fattening upon the unresisting beings that abound in those dark waters wherein it loves to reside. It will take a worm from the hook of those that angle in ponds; and in some places I have seen the boys in the spring of the year draw it up by their fishing-lines, a very extraordinary figure, having a small shell-fish (*tellina cornea*) attached to one or all of its feet; the toes of the newt having been accidentally introduced into the gaping shell, in its progress on the mud at the bottom of the pool, or designedly put in for the purpose of seizure, when the animal inhabitant closed the valves and entrapped the toes. But from whatever causes these shells became fixed, when the animal is drawn up hanging and wriggling with its toes fettered all round, it affords a very unusual and strange appearance.

Water, quiet, still water, affords a place of action to a very amusing little fellow (*gyrinus natator*), which

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THE WATER-FLEA.

about the month of April, if the weather be tolerably mild, we see gamboling upon the surface of the sheltered pool; and every schoolboy, who has angled for a minnow in the brook, is well acquainted with this merry swimmer in his shining black jacket.

Retiring in the autumn, and reposing all the winter in the mud at the bottom of the pond, it awakens in the spring, rises to the surface, and commences its summer sports.

They associate in small parties of ten or a dozen, near the bank, where some little projection forms a bay, or renders the water particularly tranquil; and here they will circle round each other without contention, each in his sphere, and with no apparent object, from morning until night, with great sprightliness and animation; and so lightly do they move on the fluid, as to form only some faint and transient circles on its surface. Very fond of society, we seldom see them alone, or, if parted by accident, they soon rejoin their busy companions. One pool commonly affords space for the amusement of

several parties; yet they do not unite, or contend, but perform their cheerful circlings in separate family associations. If we interfere with their merriment they seem greatly alarmed, disperse, or dive to the bottom, where their fears shortly subside, as we soon again see our little merry friends gamboling as before.

This lively little animal, arising from its winter retreat shortly after the frog, at times in March, continues its gambols all the summer long, remaining visible generally until the middle of October, thus enjoying a full seven months of being; a long period of existence for insects, which are creatures subject to so many contingencies, that their lives appear to be commonly but brief, and the race continued by successive productions.

GLOSSOLOGY:

BEING A TREATISE ON THE

NATURE OF LANGUAGE

AND ON THE

LANGUAGE OF NATURE.

BY

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NEW-YORK:

PUBLISHED FOR THE AUTHOR.

GEORGE P. PUTNAM, 10 PARK-PLACE.

1852.

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and ear—to hear; 3 men—to follow; man on a hill=hermit; house and heart=temple; woman, hand and broom=matron, etc. Some of these are phonetic, and their number is not great. 3. Signs proper expressing shapeless things, f. i., a horizontal line=1, 2 horizontal lines=2, 3 such lines=3, 1 such line and dot above=above, superior; the same with dot below=under, beneath, below, inferior; a circle bisected=middle. 4. Other few signs become significant by their inverted direction, opposition, f. i., a three-forked figure towards left=left side, the same in opposite direction=right; line of sitting man=living man, etc. 5. Metaphoric or borrowed characters, significant by association of ideas in various ways, can be called ideographic, f. i., a squinting eye of which the iris cannot be seen=white; a sprouting plant—to grow, to originate, begin; 2 muscle-shells=friends, companions; house=man; room=woman; heart=spirit, intelligence; hand=artist, mechanic, etc. 6. The graphic characters called *hi-shi* (with a nasal as in French, but without altering the sound of *i* as in the French word *fin*, which sounds *fe* through the nose), i. e., images and sounds, constituting at least $\frac{2}{3}$ of all signs now in use, consist of a phonetic element

Iconography, i. e., the tracing of the figures of objects, for the purpose of communing with others, was the original mode of the CHINESE. It has been developed to a considerable degree of phonography, notwithstanding the peculiar nature of their languages. The Chinese words do not coalesce into compounds; they are all monosyllabic and terminate in either oral or nasal vowels. Only in the Canton and some other impure dialects, some words end in consonants.

All Chinese characters are divided into the following six classes:

1. Only about 200 characters are pure images representing visible objects (*iconography*), f. i., the sun, moon, a tree, etc.; the original pictures of which have been altered into linear signs, and inserted among the 214 keys or radical signs (*Poó tribunals*) of which again all the usual characters are composed. 2. Combinations or groups of those pure images became symbols of other objects or conceptions,

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with which they have a natural analogy, thus sun and moon=light, splendor; bird and mouth=bird-song; eye and water=tears; door

Between the years 360–80 A. C., Bishop ULPHILAS adapted the Greek alphabet to his translation of the Gospel, into the *Gothic* language, in Mœsia on the Lower Danube. Hence the name of MÆSO-GOTHIC. The principal manuscript written in silver-letters on a dark ground (*Codex argenteus*) is now preserved at Upsala in Sweden. The number of letters occurring in the original is 25, but some writers add a kind of *q* before *r*. Junius, Hickes, and Bosworth agree as to their order and number; Lye differs somewhat. The figures are, on the whole, so to say, half Greek half Latin; the *o* is represented by an inverted *u*. There is a letter for *cw*, one for *th*, one for *ch*.

In the opinion of RASK, the monumental RUNIR (from *rún*, or *ryn*, G. *Rinne*, channel, spout, running, groove, according to OL. WORMIUS; from *ge-ryne*, G. *ge-raune*, whispering, mystery, as SPELMAN believes) were introduced into Scandinavia before our era, and were continued there, as well as in the northern parts of Germany, for some centuries after Christ. We cannot enter upon details, and leaving the *Celtic* and other varieties used in *Lombardy*, etc., out of the question, it will suffice to enumerate the *Norse Runes*. They were originally 16 in number, in the following order, given here with their names, the first sound of which is betokened by the respective character. The numeric value is prefixed to each.

1. *Fie*, *fè*; L. *pec-us*, cattle.
2. *Ur*; L. *ur-us*, wild bull; also torrent, iron-sparks.
3. *Þuss*; *Thor-u*, mountain-spirit (comp. 12).
4. *Oys*; L. *os*, oris; *osti-um*, and gulf, Oñin.
5. *Riðhr*; cavalry (*riðer-y*). carriage.
6. *Kaun* and *cen*; boil, L. *ulc-us*, prurigo (comp. *καῦσ-ις*, burning).
7. *Hagl*; *hail*, and hairy, angular.
8. *Naud*; *need*, fetters.
9. *Jis*; *icicle*, Anglo-Saxon, *ises-gecel*, i. e., ice+cooled.
10. *Aar*; *y-ear*, L. *ar-o*, plough.
11. *Sól*; *sun*.
12. *Tyr*; L. *taur-us*, bull; giant *Thurs* (comp. 3).
13. *Bjarkan*; *birch*.
14. *Lagur*; *liqu-or*, *lak-e*.
15. *Madur*, *mander*; *man* looking at the stars.
16. *Yr*; L. *arc-us*, compare *ar-row*.

To these were afterwards added 6 more, i. e., 5 from among the above, distinguished by *inscribed dots*, and hence called *stungen*, i. e., *stung*, viz., *stungen Kaun* or *Knesol*, to note our *g*, as in *get*; *st. Jis*, our *e* in *end*; *st. birk*, for our *p*; *st. fe*, for our *v*; and *u* in *full*; *st. úr* (not admitted by all writers) for our *u* and *y*;—and a combination of *h* with *s*.

The ANGLO-SAXON alphabet was formed in our 6th century, from the Latin, as then shaped. It underwent several modifications which are denominated as follows: *Roman-Saxon*, found in the Durham-book; *Set Saxon*, from the middle of the 8th to that of the 9th century; *cursive* or *running-hand*, at the end of the 9th century, patronized by king Alfred; *mixed* (with Roman, Lombardic), till the beginning of the 11th century; *Elegant Saxon*, used from the 10th to the middle of the 13th century. The schemes given by Hickes, Bernard, Lye, Bosworth and others, vary somewhat; so that taking all things into consideration, we find, in reality, 25 letters, and, comparing them with the present 26 English, the following discrepancies between both. There were 2 characters representing our soft *th* in the (Ð, ð) and our harsh aspirated *th* in (thick (þ, þ)); but there were no letters answering to our present *j*, *q*, *w*.—As regards the shape of the characters, the following Anglo-Saxon differed

gieð, and by many others; without producing an essential difference in their meaning.

Among the Celtic languages, the IRISH possesses two kinds of writing, the ancient mysterious *Ogham Chraov*, the characters of which are attached to a horizontal line and which consist of 5 sections, of 5 letters each,

i. e., *Bobel*, ghost; *Loth*, light; *Foran*, cunning; *Salja*, wave, sea; *Nabgadol*, ruler, etc.; with one character more (*Peithboc*) intercalated after the 13th. The other series agrees with our *alphabetic series*, of recent date, and it contains but 18 letters, i. e. *Ailm*, arms, palm; *Beith*, beech, shelter, good; *Coll*, hazel, food; *Druj*, oak, God (hence *Dru-id*, Gr. *δρῖς oak*; comp. Engl. *tree*), *Eadad*, aspen, timid; *Fearn*, alder, barren; *Gort*, ivy, grasp; *Joga*, dead, yew; *Luis*, quick-beam; *Mujn*, vine, juice; *Nujn*, ash; *On*, or *Oin*, bloom; *Peith*, dwarf elder; *Rujs*, bore-tree-elder; *Sujl*, willow (L. *salix*); *Tme*, furze; *Ur*, cypress, health; *Huath*, hawthorn. To these are added *Quert*, apple-tree; *aNsath* (nasal *ng*), reed; and *Zegthrojd*, sloc-tree.

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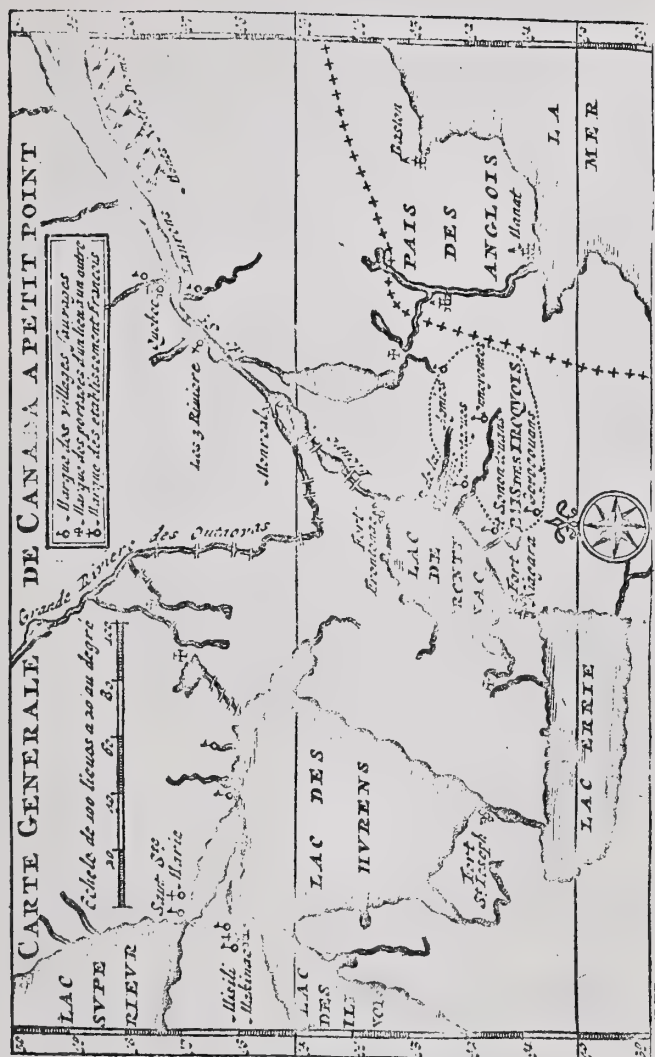
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somewhat from our present capitals, viz., C, G, H, M, V; the small letters differed more, especially the *e*, *f*, *g*, *r*, *s*, *t*, *v*. The *c* was mostly used where the English now has *k* before the slender vowels, and of course everywhere where it has *c* even in the combination *ch*, so that *child*, *Chester*, were written *cild*, *Cester* (sounding *k*). Our *sh* was written *sc*, thus *scip*, *fisceras*, instead of *ship*, *fishers*. *G* was always sounded hard as in *give*. The *v* was pronounced in

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the middle, or at the end of syllables, like the Germ. *ö* or French *eu*. As regards what is called *spelling* or orthography now-a-days, there was no standard; all the changes of cognate sounds were rung, so that one word was written in great many ways at one time, or at different times, f. i., our *give* thus: *gif*, *giffs*, *given*, *geive*, *gin*, *g'me*, *yef*, *yeve*, *yeoven*, *yf*, *if* (hence our *if*, i. e. given, admitted, on condition). This luxuriance of forms was governed by a latent law of phonetic affinities, as if many dialects (*dia-gonal* or *bias-sed* ways of speaking) were collected in one idiom. The above number of forms might be augmented by those existing in German, viz., *gib*, *geben*, *gab*, *gäbe*,



MEMOIRES

DE L'AMERIQUE SEPTENTRIONALE, OU LA SUITE DES VOYAGES DE Mr. LE BARON DE LA HONTAN:

Qui contiennent la Description d'une grande étendue
de Pais de ce Continent, l'intérêt des François & des
Anglois, leurs Commerces, leurs Navigations,
les Mœurs & les Coutumes des Sauvages, &c.
Avec un petit DICTIONNAIRE de la Langue du Pais.

Le tout enrichi de Cartes & de Figures.

TOME SECOND.

Seconde Edition, augmentée des CONVERSATIONS de
l'Auteur avec un Sauvage distingué.



A AMSTERDAM,

Pour JONAS L'HONORE' à la Haye.

M DCC V.

DE L'AMERIQUE. 159
petits Lacs, & que ces sentinelles criant à l'approche des hommes ou des bêtes, tous les travailleurs se jettent à l'eau & se fau-vent en plongeant jusqu'à leurs Cabanes. J'avance ce fait sur le rapport de mille per-sonnes, qui n'ont aucun intérêt de vouloir en imposer par des fables, mais voici ce que j'ai observé moi-même sur cette ma-tière au Pais de Chasse des Outaouais, dont j'ai parlé au commencement de ma seizième Lettre. Les Castors se trouvant dans une prairie traversée de quelque ruisseau, ils se déterminent à faire des digues & des chauffées, lesquelles arrêtant le cours de l'eau, causent une inondation sur toute cette prairie, qui se trouve avoir quelquefois deux lieues de circonférence. Cette digue est faite d'arbres qu'ils coupent avec leur quatre grosses dents incisives, & qu'ils traitent ensuite à la nage. Ces bois étant au fond de cette prairie rangés de travers, ces Animaux se chargent d'herbes & de terre grasse, qu'ils transportent sur leur grande queue & qu'ils jettent entre ces bois avec tant d'art & d'industrie, que les plus habiles Maçons auroient bien de la peine à faire des murailles à chaux & à ciment qui fussent plus fortes. On les entend du-rant la nuit travailler avec tant de vigueur & de diligence, qu'on croit que ce se-roit des hommes, si on n'étoit pas assuré que ce sont des Castors. Les queues leur servent de truelles, leurs dents de haches, leurs pattes de mains, & leurs pieds de ra-mes, enfin ils font des digues de quatre

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MEMOIRES
ou cinq cens pas de longueur, de vingt pieds de hauteur & de sept ou huit d'épais-sieur en cinq ou six mois de tems, quoi qu'ils ne soient que cent travailleurs tout au plus. Il faut remarquer en passant que les Sauvages ne rompent jamais ces digues par scrupule de conscience, se contentant seulement d'y faire un trou, comme je l'expliquerai dans la suite. Outre le talent qu'ils ont de couper des arbres, celui de les faire tomber sur l'eau me paroît tout à

fait surprenant, car il faut du jugement & de l'attention pour y réussir, & sur tout pour prendre au juste le tems que le vent peut les aider à rendre la chute de ces arbres plus facile, & à les faire tomber sur leurs petits Lacs. Ce n'est pas le plus bel ouvrage de ces Animaux, celui de leurs Cabanes surpasse l'imagination; car enfin il faut qu'ils aient l'adresse & la force de faire des trous au fond de l'eau pour y planter six pieux, qu'ils ont le soin de planter directement au milieu de l'étang; c'est sur ces six pieux qu'ils font cette petite maisonnette construite en figure de four, étant faite de terre grasse, d'herbe & de branches d'arbres à trois étages pour monter de l'un à l'autre quand les eaux croissent par les pluies ou par les dégelés. Les planchers sont de joncs, & chaque Castor a sa chambre à part. Ils entrent dans leur Cabane par dessous l'eau où l'on voit un grand trou au premier plancher, environné de bois de tremble, coupé par morceaux pour les attirer plus facilement dans

DE L'AMÉRIQUE. 161
leurs cellules lors qu'ils ont envie de manger; car comme c'est leur nourriture ordinaire, ils ont la précaution d'en faire toujours de grands amas, & sur tout durant l'Automne, prévoyant que les gelées doivent glacer leur étang, & les tenir enfermés deux ou trois mois dans leurs Cabanes.

Je n'aurois jamais fini, si je me mettois à faire la description des différents ouvrages de ces ingénieux Animaux, l'ordre établi dans leur petite République, & les précautions qu'ils prennent pour se mettre à l'abri de la poursuite des autres Animaux: ce que je remarque c'est que tous les autres qui sont sur la terre, en ont d'autres à craindre, quelque forts, agiles ou vigoureux qu'ils puissent être, mais ceux dont je parle n'ont uniquement que les hommes à appréhender, car les Loups, les Renards, les Ours, &c. n'ont garde de s'ingérer de les aller attaquer dans leurs Cabanes, quand même ils auroient la faculté de plonger.

RELATION

DE CE QUI S'EST PASSE'

DE PLUS REMARQUABLE

es Missions des Peres de la

Compagnie de IESVS,

EN LA

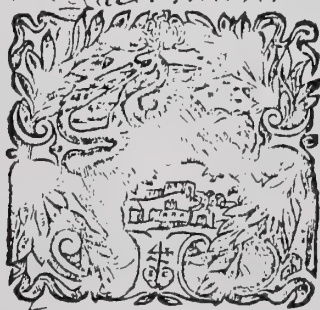
NOUVELLE FRANCE,

ES ANNEES 1647. & 1648.

Enuoyée au R. P. Prouincial de la Prouince
de France.

Par le Superieur des Missions de la mesme

Compagnie.



A PARIS,

Chez { SEBASTIEN CRAMOISY, } rue S.
Imprimeur ordinaire du Roy, } Jacques,
& de la Reyne Regente, } aux Cl.
ET }
{ GABRIEL CRAMOISY. } cognes.

M. DC. XLIX.

AVEC PRIVILEGE DV ROY.



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Permission du R. P. Prouincial.

NOVS Estienne Charlet Prouincial de la Compagnie de IESVS en la Prouince de France, auons accordé pour l'aduenir au sieur Sebastien Cramoisy Marchand Libraire, Imprimeur ordinaire du Roy & de la Reyne Regente, Bourgeois & ancien Escheuin de cette Ville de Paris, l'impression des Relations de la Nouvelle France. Fait à Paris ce 30. Decembre 1648.

ESTIENNE CHARLET.

1



RELATION DE CE QVI S'EST PASSE' EN LA NOUVELLE FRANCE SVR LE GRAND Fleuve de S. Laurent, en l'année mil six cens quarante-huit.

AV R. P. ESTIENNE CHARLET
*Provincial de la Compagnie de IESVS,
en la Prouince de France.*



MON R. PERE,

Voicy nostre tribut annuel, vn petit plus gros que celuy de l'année passée ; aussi l'auons-nous recueilly, non seulement des nations plus voisines ; mais encores des plus éloignées.

2

Vostre R. verra dans ces deux Relations vn bon nombre de Sauuages baptizez ; elle apprendra que la Foy iette ses racines bien auant dans le cœur des Croyans ; que ceux qui l'ont embrassée commencent à faire corps, & à résister aux Payens qui l'attaquent, tantost à la sourdine, tantost à découuert ; qu'elle a triomphé puissamment dans les plus grands dangers ; que les Hiroquois ennemis communs des François, & des Sauuages leurs alliez, ont plus perdu que gagné cette année ; que mal-gré leurs embusches, & leurs armes, nous auons fait passer du secours dans les contrées plus hautes ; du moins croyons nous que quatre de nos Peres qui frappaient à la porte, depuis vn an ou deux, sont entrez dans le pays des Hurons avec vne vingtaine de François ; que ceux qui nous erioient à l'ayde, & que nous auons secouru autant que nous auons pû, pour ne pas perdre vne si belle occasion que celle qui se presentoit, attendoient vn plus grand nombre d'ouuriers Euangeliques : c'est la seule chose qu'ils desirerent & souhaitent, & dont le manquement leur fera perdre les occasions de s'estendre, aussi

3

bien qu'à nous icy bas, de continuer quelques Missions que nous auons commencées.

Voila M. R. P. sommairement ce que vostre R. verra plus en détail dans ces Relations, reste que ie prie tres-humblement vostre R. & tous nos Peres & Freres, de nous auoir pour recommandez à leurs saints Sacrifices & prieres, à ce que nous soyons soigneux de nous maintenir, dans la fidele correspondance de nostre part, aux desseins adorables, de la Diuine Majesté sur ces pauures peuples.

De Vostre Reuerence,

*De Quebec ce 15.
d'Octobre 1648.*

Seruiteur tres-humble &
tres-obeissant en N. S.
HIEROSME LALEMANT.

4

De l'arriuée des vaisseaux.

CHAPITRE I.

IL fait beau voir deux personnes de merite & de vertu dans vn combat de deference, lors principalement qu'vne d'icelles met bas les interets qui le porteroient à s'en dispenser, s'il ne fortifioit son courage par quelque pensée plus haute & plus releuée que celles du commun. Si tost que Monsieur le Cheualier de Montmagny, eut connoissance des volontez du Roy, & de la Reyne, & qu'il eust appris par l'arriuée des vaisseaux, que leurs Majestez auoient pourueu Monsieur d'Ailleboust du Gouvernement du pays en toute l'estendue du Fleuve de S. Laurent, non seulement il receust cet ordre avec honneur, & avec respect, mais de plus, il fit paroistre vne genereuse magnanimité, faisant disposer avec appareil, toutes les choses necessaires, pour la reception du nouveau Gouverneur, qui fut en suite receu par tous les ordres du pays, qui le compli-

4 Relation de la Nouvelle France

en l'année 1648.

menterent, & les Sauvages mesmes voulurent estre de la partie, luy faisant vne petite harangue, par la bouche d'un Religieux de nostre Compagnie, qui les conduisoit. Si l'un emporte nos regrets, & nous laisse vne memoire eternelle de sa prudence, & de sa sagesse; l'autre, dont la vertu desia connue, en ce nouveau monde, nous donne, ie ne diray pas seulement vne esperance, mais comme vne assurance, que les fruits desia bien avancez meuriront, & que le Royaume de Dieu continuera de s'estendre, & de s'emplir dans ces contrées. Il n'obmet rien pour rendre le reciproque à son Predecesseur, ne pouvant trouver assez d'honneur pour reconnoître le merite, & la vertu de ce braue Cheualier.

Mais pour ne m'écarter de mon discours, le premier vaisseau nous ayant consolé par le retour du Pere Barthelemy Vimont, & par la venue de trois bonnes Religieuses Hospitalieres, qui resjouirent infiniment leur maison, nous attrista par le nombre des personnes malades, qu'on fit porter en cette maison de charité, & de misericorde. C'est chose rare que les maladies se iettent

6 Relation de la Nouvelle France,

dans les vaisseaux qui viennent en ce pays, si la trauersée est vn peu rude pour les mers, elle n'a pas coustume d'alterer la santé des corps. Quelque mauuais air pris en France, ou les grandes chaleurs qu'ils ressentirent approchant des Assoures, ou la corruption des viures mal choisis, ou tout cela ensemble leur a causé ie ne sçay quelle epidemie, qui en a fait mourir quelques-vns, & en a tourmenté vn assez bon nombre. Monsieur de Repentigny fut enléué en moins de douze iours, mais avec vne benediction toute particuliere, sa mort, dit le Pere, qui l'a assisté iusque au dernier soupir, a esté pretieuse deuant Dieu, tant il estoit solidement resigné à ses volontez. La plus ieune des trois Religieuses, nommée la Mere Catherine de S. Augustin, fut iusques aux portes de la mort, ou plustost iusques aux portes du Paradis; mais son Epoux la voulût éprouuer plus long-temps dans les souffrances luy rendit la santé, sa vocation en ce nouveau monde est assez remarquable, son ardeur luy faisoit sou-

haitter les Croix avec amour, & son pere craignant les hazards s'opposa si fortement à son depart qu'il presenta requeste

en l'année 1648.

7 au Parlement de Roüen, pour l'empescher de sortir du Conuent de la Misericorde de Bayeux, où elle estoit Religieuse; cette pauvre petite Colombe estant dans les gemissemens, & ses parens dans la resistance, il arriua que son pere iettant les yeux sur la Relation de l'an passé, fut si fortement touché en lisant les horribles tourmens que le bon Pere Isaac Jogues a souffert, que cela mesme qui sembloit le deuoir plus opiniatrement confirmer dans ses oppositions, luy fit lâcher prise; Est-il vray, dit-il, qu'on souffre si genereusement pour Dieu, en ces contrées? Le desire que mes deux filles y aillent, i'en refusois vne, & ie les donne toutes deux, c'est icy où il y eut du combat. Ces deux sœurs Religieuses en mesme maison, se vouloient toutes deux sacrifier, & il n'en falloit qu'une, le S. Esprit fit tomber le sort, & la Croix sur la plus ieune, & les larmes, & les regrets sur l'aînée.

Les deux autres Religieuses appellées la Mere Anne de l'Assomption, & la Mere Jeanne de sainte Agnes, sont parties l'une de la Communauté des Meres Hospitalieres de la ville de Dieppe, qui est

8 Relation de la Nouvelle France,

la pepiniere des autres maisons, & qui nous a donné les premieres Religieuses de l'Hospital de Quebec; l'autre est venue de l'Hostel Dieu de Vennes en Bretagne. Dieu a brisé tous les obstacles qui leur empeschoit le passage, & les a rendues saines & sauues dans leur petite maison, qui attendoit ce secours avec impatience.

Les nouvelles qui se debitent à la venue des vaisseaux ressemblent assez souuent aux iours & aux années de Iacob, s'il y en a de bonnes, il y en a bien souuent de mauuaises, nous en auons appris vn tres-fauorable pour quantité de Sauvages des nations plus hautes. Madame la Princeesse respendant les bontez de son cœur iusques aux derniers confins de ce nouveau monde, s'est declarée Mere & fondatrice de la Mission surnommée des Apostres, en la nation vulgairement ap-

pelee du Petun: elle veut contribuer à la conuersion de ces peuples, & pendant que son fils Monseigneur le Prince amplifie le Royaume de France, elle veut estendre les limites de l'Empire de Iesus-Christ.

en l'année 1648:

9 de deux ieunes François qui ont esté bien regrettez en ce pays, tant pour leur vertu que pour la connoissance qu'ils auoient des lāgues; l'un desquels s'appelloit François Marguerie, & l'autre Jean Amiot, qui trauerfians le grand Fleuve deuant les trois Riuieres dans vn canot de Sauvages

Le vœux finit ce Chapitre par la mort

vic.

Iean Amiot (c'est-celuy qui prit l'an) passé vn Hiroquois, lequel chantoit ces paroles dedans les feux, Antaiok (c'est ainsi que les Hiroquois & les Hurons le nommoient) est cause que ie vay au Ciel, j'en suis bien aise, ie luy en scay bon gré) descendant à Quebec (quelque temps deuant sa mort, pour obtenir congé de Monsieur le Gouverneur, de mener vne escouade de François, contre les Hiroquois, & provoqua tous les ieunes gens à la course, soit avec des raquettes aux

10 *Relation de la Nouvelle France,*
pieds, soit sans raquettes, quelques-vns descendirent en lice contre luy; mais il remporta la victoire, son humeur estoit si agreable, que les vaincus mesmes luy portoient de l'amour & du respect. Il estoit adroit à destourner les mauuais discours, & à reprendre avec grace ceux qui iuroient, ou qui se donnoient des imprecations, & par ce moyen empeschoit bien du mal, & n'offensoit personne: car son innocence, avec l'opinion qu'on auoit de son courage, le mettoit à couuert. Il auoit vne deuotion tres-particuliere & tres-constante à S. Ioseph, qu'il auoit prise en la maison de Sainte Marie aux Hurons, où il a esté élué. Comme il se iettoit à toute heure dans les dangers, aux alarmes que nous donnoient les Hiroquois, il dit à vn de nos Peres, S'il arriue que ie meure, ie desire que ces bois & les autres materiaux que ie dispose pour me faire bastir vne maison, soient appliquez pour faire dresser vne petite Chappelle à l'honneur de S. Ioseph. Il auoit fait vœu de jamais ne rien refuser de tout ce qui luy seroit demandé au nom de ce grand Saint, il luy dedioit ses courses, ses voyages, ses combats, &

en l'année 1648.

11

comme on parloit d'un camp volant contre les Hiroquois: S'il m'estoit permis, disoit-il, de nommer cette petite armée, ie l'appellerois l'armée de S. Ioseph. Ce chaste Epoux de la Vierge auoit obtenu à ce ieune guerrier vne pureté Angelique, ceux qui l'ont connu plus particulièrement assurent que iamais il n'est tombé en aucune coulpe mortelle, il s'est trouué dans mille dangers, il a esté si fortement sollicité, qu'il luy a fallu laisser la robe, ou le manteau aussi bien que l'an-

cien Ioseph, Dieu l'a voulu mettre au rang des vierges. Il estoit sur le point de se marier quand il est mort, ses camarades s'estonnoient de sa retenue: car il faisoit l'amour en Ange, pour ainsi dire.

Plusieurs ont creu que Dieu l'auoit rayé en sa ieunesse, afin que le credit & l'estime dans lequel il entroit par son courage & par son adresse n'alterassent son innocence, & ne fissent bresche à sa vertu.

Ie luy ay ouï raconter, qu'estant allé certain iour à la chasse, où il y auoit des Hiroquois en embuscade, il se sentit saisi d'une grande frayeur, ce qui ne luy arriuoit iamais: car il estoit hardy au dernier

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point, prudent neantmoins fondant son courage sur l'appuy qu'il auoit en Dieu. Il s'efforça plusieurs fois d'auancer, mais il ne faisoit que tourner dans les bois, en sorte qu'il ne pût iamais passer outre, il s'adresse à son Pere S. Ioseph, & à mesme temps il dit à vn Huron qui l'accompagnoit, retirons-nous d'icy, il n'y fait pas bon: le lendemain quelques Algonquins allans en ce lieu mesme, tomberent dans l'embuscade des Hiroquois. Pour conclusion, ce braue soldat de S. Ioseph a fait vingt-cinq ou trente lieues de chemin apres sa mort, pour estre enterré en la residence de S. Ioseph.

*De ce qui s'est passé entre les François
& les Sauvages leurs allies, &
les Hiroquois.*

CHAPITRE II.

LE dix-huitième de May deux canots d'Hiroquois ayans trauersé le grand Fleuve à la veüe du fort de Montreal, se vindrent froidement desambar-

en l'année 1648.

13

quer dedans l'Isle: & sans faire paroistre aucune apprehension, sept ou huit de leur bande tirerent droit au quartier des François. Monsieur de Maisson-neufue Gouverneur de cette Isle, fit auancer quelques soldats pour les reconnoistre, ces Barbares les ayant apperceus, firent alte, & demanderent par signe à parler, on leur enuoye deux Truchemés

beaux discours, les assurent reciproquement de la sincerité de nos pensées, & de la bonté de nos cœurs, brefs ils vindrent iusques à ce point de confiance, que deux Hiroquois passerent dans l'escouade des François, & l'un des deux interpretes s'alla ioindre aux Hiroquois:

qui s'arrestent fort long-temps avec eux. Nous n'auons point de guerre avec les François, disoient-ils, nous n'en voulons qu'aux Algonquins, ceux-là seuls sont nos ennemis, oublions le passé, & renouons la paix plus fortement que iamais. Nos Interpretes charmez par ces

car les vns & les autres ne se parloient que de loin. Monsieur de Maisson-neufue craignant quelque surprise, se transporta avec quelques soldats au lieu où se faisoit ce pour-parler, & ayant fait entendre à

*Diuerſes choſes qui n'ont peu eſtre rap-
portées ſous les Chapitres precedens.*

CHAPITRE X.

VN Sauvage ayant tué vn Loutre, le mit encortout chaud à l'entour du col d'un François, & auſſi-toſt le François tomba en ſyncope, comme ſ'il eut eſté mort, le Sauvage prenant ce Loutre par les pieds de derriere, en donne quelques coups ſur le ventre du François, qui reuint à ſoy quaſi en vn moment: ie laiſſe aux Medecins à iuger de la cauſe, mais il eſt certain que ce que ie viens de dire a eſté fait.

Ce Chapitre ſera compoſé de bigarreures. Il y a deſia aſſez long-temps que deux Sauvages voulans paſſer la grande Riuiere ſur la fin de l'hyuer, & n'iaſt point de batteau de bois ny d'écorce, ils en firent vn de glace en ayant trouué vne aſſez grande ſur les bords, ils la font flotter, & s'eſtans mis deſſus, ils eſtendent vne grâde couuerture, dont ils faiſirent les deux extremitéz, d'en
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basauec leurs pieds, éleuant le reſte en l'air avec leurs épées, afin de receuoir vn vent fauorable qui les fit paſſer ce grand fleuve à la voile, ſur vn pont ou ſur vn batteau de glace. Ce jeu eſt vn jeu de hazard, ſi quelqu'un y gaigne, d'autres y perdent.

Voicy vne ſimplicité bien agreable à noſtre Seigneur, deux Sauvages ſe trouuaſt en danger, dont l'un eſtoit Chreſtien & l'autre Catechumene, celuy-cy craignant plus pour ſon ame que pour ſon corps, dit à ſon camarade, que feray-ie ſi ie meurs, moy qui ne ſuis pas Chreſtien? ne pourrois-tu pas bien me baptiſer? ſi tu ne le fais, ie ſuis perdu pour vn iamais? ie ne ſçay pas bien, repart ſon camarade, comme il faut faire, car t'eſtois bien malade quand on me baptiſa, ie me ſouuiens neantmoins qu'on fit le ſigne de la Croix ſur ma teſte, & qu'on me dit que mes pechés eſtoient effacés, & que ie n'irois point au feu, ſi ie ne me ſaliſſois derechef, hé bien, dit le Catechumene, fais-moy la meſme choſe, car ie t'aſſeure que ie

croy tout ce qu'on nous a enſigné, j'en ſuis content, répond le Chreſtien, &

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là-deſſus il fait mettre ſon proſelite à genoux, puis s'adreſſant à Dieu il luy dit, toy qui aſ tout fait, empeſche cét homme d'aller en Enfer, cela ne ſeroit pas bien qu'il y allaſt, efface tous ſes pechez, & le deſtourne du mauuais chemin: il fit en ſuite le ſigne de la Croix ſur luy, & voila vn Baptême à la Sauvage. Dieu peut donner à ces bonnes gens vn acte d'un vray anſur, en conſideration de leur foy & de leur ſimpl cité, ce qui n'empeſche pas qu'on ne leur conſere par apres le veritable Sacrement. On dira qu'il ſeroit bien à propos, que quelques-vns d'entre eux, fuſſent bien inſtruits ſur la forme du Baptême: cela eſt ainſi, en eſſet, & nous n'y manquons pas: mais on n'oſe pas conſier ces grands Myſteres à toutes fortes de perſonnes, pluſieurs s'en ſeruiroient ſans diſcretion.

Voicy vne réponſe prudente pour vn Sauvage, ceux de Tadouſſac s'eſtans liés avec ceux de Kebec, vindrent ſaluer Mōſieur noſtre Gouverneur, pour decouurir quelles eſtoient ſes penſées, touchant les priſonniers Hiroquois, qui s'eſtoient venus ietter entre nos mains;

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ils apprehendoient que nous ne fiſſions la paix independamment d'eux: ils alleguoient mille raiſons, pour monſtrer la perfidie de ces peuples, & pour nous engager à continuer la guerre. Monſieur le Gouverneur leur fit dire, qu'il s'eſtonnoit, comme ils vouloient entrer dans la cōnoiſſance de ſes penſées, eux qui ſembloient cacher leurs deſſeins, on voit, adiouſta il, arriuer tous les iours nombre de Sauvages étrangers, qui de vous autres les a mandés ſans m'en rien communiquer? qui les doit commander? vn Capitaine répondit fort adreſſement, ceux que vous voyez ſont des enfans ſans peres, & ſans parens, ſans chefs, & ſans conduite, leurs Capitaines qui leur ſeruoient de Peres eſtans morts l'an paſſé, ces pauures orphelins ſe ſont venus retirer vers leurs Alliez. Allons (ce ſc it-ils dit les vns aux autres) allons voir nos Amis, on nous apprend qu'ils ont la guerre, allons gou-

François rompoit la reſte au Sauvage, luy diſant ſouuent Ka kiniftetſiſſi, ie ne t'entends pas, le Sauvage ſe voyant deliurer de cette importunité, luy dit d'une voix forte, tu n'aſ garde de m'entendre, tu aſ des oreilles Françoises, & j'ay vne lague Sauvage, le moyen que tu m'entende? coupe tes oreilles,

elté mandez.
Voicy vn autre petit trait facecieux, vn François deſireux d'apprendre quelque choie de la langue Algonquine, preſſoit fort vn Sauvage de l'inſtruire: celuy-cy le faiſoit avec beaucoup d'affectiō, mais comme ils ne s'entendoient pas bien l'un l'autre, & que le

ſter de la chair de leurs ennemis: au reſte ils ſont ſous voſtre cōduite, ils auanceront ou reculeront ſelon vos ordres. Cette repartie fort prompte, fut priſe pour vne deſſaite pleine d'eſprit: car on

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ſçauoit bien que ces étrangers auoient

& prends celles de quelque Sauvage, & alors tu m'entendras fort bien.

Je ne veux pas oublier vne gentille défaite, accôpagnée d'une rodemontrade, faite par vn poltron, dans le combat entre les Hurons & les Hiroquois, vn Huron desjà âgé, épouuanté à la veüe des feux, & au bruit des armes, s'enfuit si auant dans les bois, qu'il fut vn long-temps sans paroistre: les victorieux ne l'ayans point trouué entre les

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morts, & le voyant de retour, luy donnerent en riant quelque soubriquet, luy voulant éluder leur gaufferie, leur dit, mes neveux, vous n'avez pas sujet de vous rire, & de vous gauffer de moy, si bien de vostre lascheté: si vous auez autant de courage à poursuire l'ennemy, comme en a eu vostre oncle, vous auriez plus de prisonniers que vous n'avez pas. l'ay couru si loin, & si fort, qu'enfin ceux que ie poursuiois m'ayans lassé, ie me suis perdu, & fouruoyé dans les bois, c'est pourquoy j'ay tant tardé apres les autres. Les Sauvages se payerent de cette raison, non pas qu'ils ne vissent bien, que c'estoit vne fausse monnoye: mais ils ne sçauent quasi que c'est, de courir de honte, & de confusion le visage d'un pauvre homme, iamais ils ne se poursuivent l'espée dans les reins, pour se confondre de parole, & pour se mettre à non plus.

Je placera y en ce lieu vne action, qui doit estre mise entre les amitez memorables de l'antiquité. Vn ieune Hiroquois âgé de 19. à vingtrans, s'estant sauué dans la défaite de ces gens dont nous

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auons parlé cy-deuant, mais en sorte qu'il estoit entierement hors de tout danger, voyant que son frere aîné, auquel il auoit donné parole qu'il ne l'abandonneroit iamais, ne paroissoit point, il s'en retourne froidement sur ses pas, & se dourant bien que son frere estoit pris, il le vient chercher entre les mains de ses ennemis: Il aborde les trois Riuieres, il passe deuant plusieurs François qui ne luy disent aucun mot, ne le distinguans pas des Hurons: il mōre sur vn petit tertre, sur lequel le fort est basti, & se va froidement asseoir au pied

d'une croix, plantée à la porte du fort. Vn Huron l'ayant apperceu ne fit pas comme les François, il le reconnut, & s'en saisit aussi-tost, le dépoüillant & le garrottant, & le faisant monter avec son frere sur vn échaffaut ou estoient tous les captifs. Ce pauvre garçon interrogé pourquoy il se venoit ietter dās les feux, dans les marmittes, & dans les estomachs des Hurons ses ennemis, répondit qu'il vouloit courir la mesme fortune que son frere, & qu'il auoit plus d'amour pour luy, que de craindre des tourmens, qu'il n'auoit peu souffrir en

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son pais, le reproche de l'auoir laschement abandonné. Cette amitié n'est pas commune.

Il faut remarquer, icy en passant la pieté des Hurons Chrestiens. Quand ils aborderēt les trois Riuieres, & qu'ils vinrent à passer deuant cette croix posée à l'entrée du fort, ils commanderent à leurs prisonniers de flechir avec eux le genoüil deuant cet arbre sacré, voulāt qu'ils recōussent par cet abaissemēt, la grandeur de celui qui les a racheprez sur ce bois, & qu'ils luy fissent amande honorable, pour auoir abbatu celle qui estoit plantée proche de Richelieu.

Ce que les Poëtes ont feint du rapt de Ganymedes, est fondé sur la hardiesse des Aigles, il n'y a pas long-temps, que l'un de ces grands oiseaux, vint fondre sur vn ieune garçon âgé de neuf ans, il posa vne de ses patés sur son espaule, & de l'autre il le prit avec ses serres par l'oreille opposée, ce pauvre enfant se mit à crier, & son petit frere âgé de trois ans, tenant vn baston en main, taschoit de frapper l'Aigle: mais il ne branla point. Cela peut estre l'empescha de porter son bec sur les yeux & sur le vi-

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sage de cet enfant, & donna loisir à son pere de venir au secours, cet oiseau entendant vn bruit de voix humaines, parut vn petit estonné, mais il ne quitta pas sa prise: il falut que le pere, qui estoit accouru, luy cassast la cuisse, & comme de bonne fortune il renoit en main vne faucille, à mesme temps que cet Aigle se sentant blessé se voulut eleuer, à mesme temps on luy coupa la teste. Les Sauvages disent qu'assez sou-

de bataille à son ennemy, qu'il vainquit

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enfin par finesse: car s'estant caché dans le bois, & rechargé son arquebuse, il l'empescha non seulement de voler, mais encore de courir.

Dieu a donné de la colere à tous les

Je ne sçay si j'ay autrefois remarqué, qu'un François ayant tiré vn coup d'arquebuse sur vne grue, & luy ayant cassé vne aile, cet oiseau courut droit à luy avec ses grandes iambes, portant son bec cōme vne demie lance, vers sa face, mais avec vne telle impetuosité, qu'il cōuint au chasseur de quitter le champ

uent des Aigles se sont iettés sur des hommes, qu'ils enleuent quelquefois des Castors, & des Eturgeons plus pesants que des moutons: cela ne me semble pas beaucoup probable, quelques-uns disent que ce sont des Griffons, & qu'on en a veu en ces contrées, je m'en rapporte.

animaux pour repousser ce qui leur est contraire : il n'est pas iusques aux tortuës qui ne tirent vengeance de leurs ennemis : il y en a icy de plusieurs sortes, les vnes ont vne grosse & forte escaille, les autres l'ont plus mince & plus delicate : celles-cy, qui n'ont pas tant d'armes deffensives, sont plus hardies. Vn

François en ayant pris vne assez grande, qu'il pensoit auoir assommée, l'attracha avec vne corde par la queue la jettant derriere son dos, cet animal quia la vie assez dure, reuenant de l'endormissement que les coups qu'on auoit deschargez sur sa teste, luy auoit causé, empoigne avec sa petite gueule son ennemy par le dos, mais si viuement, qu'il luy fit crier les hauts cris; il lâche la corde pour faire tomber la tortuë, point de nouvelle, elle demeure pendue par sa queue serrant de plus en plus, sans jamais demordre : enfin il luy fallut couper la teste pour apaiser sa colere.

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Terminons ce Chapitre par vne action, d'autant plus remarquable, qu'elle est toute nouvelle en ces contrées, les vaisseaux apportent tant de boissens, & si bruslantes, pour vendre à la dérobée aux Sauvages, que le desordre estoit entierement lamentable. Monsieur d'Aillebours nostre nouveau Gouverneur, y voulant apporter remede, fit venir les Capitaines des Sauvages, & leur demanda leurs pensées sur ce subiet, c'est vn acte de prudence, de gouverner les peuples, par ceux-là mesmes qui sont de leur nation : ces bons Neophytes répondirent, qu'il y auoit long-temps qu'ils souhaittoient, que l'yurongnerie qui passe la mer dans nos vaisseaux, n'abordast point leurs cabanes : mais qu'ils ne pouuoient obtenir de leurs gens, qu'ils declarassent ceux qui leur vendoiēt ces boissens à la fourdine. Il faut dont, repart Monsieur le Gouverneur, qu'ils subissent les loix, qu'on portera contre leurs excès : s'y estant accordé, on fit battre le rambour au sortir de la grande Messe, en la Residence de Saint Ioseph : tous les Sauvages prestent l'oreille, les François qui

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155 estoient là s'assemblent, vn Truche-

ment tenant en main l'ordonnance la leut aux François, puis la presenta à vn Capitaine Sauvage, luy interpretant ce qu'elle vouloit dire, afin qu'il la publiast à ses gens, elle portoit vne deffence de la part de Monsieur le Gouverneur, & de la part des Capitaines des Sauvages, de vendre ou d'achepter de ces boissens, & notamment d'en prendre avec excès, sur peine des punitions portées dans l'ordonnance; & vn commandement à tous ceux qui auroient quitté ou qui ne voudroient point embrasser la Foy, de sortir de cette Residence, où Monsieur nostre Gouverneur & les Capitaines des Sauvages ne vouloient souffrir aucun Apostat, les Sauvages depuis le commencement du monde, iusques à la venue des François en leur pais, n'ont iamais sceu que c'estoit de deffendre si solemnellement quelque chose à leurs gens, sous aucune peine pour petite qu'elle soit; ce sont peuples libres, qui se croient tous aussi grands seigneurs les vns que les autres, & qui ne dependent de leurs chefs, qu'autant qu'il leur plaist. Ce-

156 Relation de la Nouvelle France, pendant le Capitaine harangua fortement, & pour autant qu'il connoissoit bien, que les Sauvages ne reconnoistroient pas bien les deffences faites par vn François, il repeta plusieurs fois ces paroles : ce n'est pas seulement le Capitaine des François qui vous parle, ce sont tels & tels Capitaines, dont il prononça les noms, c'est moy avec eux qui vous assure que si quelqu'un tombe dans les fautes deffendues, nous l'abandonnerons aux loix, & aux façons de faire des François. Voila le plus bel acte public de iurisdiction, qu'on ait exercé parmy les Sauvages, depuis que ie suis en ce nouveau Monde. Il est bon de les reduire petit à petit sous les ordres de ceux que Dieu a choisis pour commander; car encor que la liberté soit la premiere de toutes les douceurs de la vie humaine, neantmoins comme elle peut degenerer en la liberté, ou plustost en la dissolution d'Asnes Sauvages, il la faut regler, & la soumettre aux loix emanées de la loy eternelle.

Pour le commandement qui estoit fait aux Apostats de sortir de la Residence de saint Ioseph, Paul Iesouchar,

autrefois desiré qu'on me traitast. Le Pere le Jeune m'instruisant, m'aprouua vn assez long-temps, ie luy en scauois bon gré, mais enfin, comme ie pris resolution d'embrasser veritablement la Foy, ie luy dy, mon Pere, ie n'ay point deux langues, mon cœur & ma bouche parlēt vn meisme langage, ie

penais, luy dit, il y a tant d'années que ie te presse de te rendre à Dieu, & tu d'embrasser fortement la priere, & tu n'as iamais donné de parole asurée, parle maintenant : car ie te declare en bonne compagnie, que ie ne veux personne auprès de moy qui ne croye fortement en Dieu. Je traite comme i'ay

157 en l'année 1648. nommé vulgairement le Borgne de l'Isle, se trouua vn petit estoigné : car comme il ne faisoit pas profession du Christianisme, il voyoit bien que cela s'adressoit à luy, & à quelques autres. Noel Negabamat, l'un de nos braues Capitaines Chrestiens, le voyant tout

t'assure que c'est tout de bon que ie croy en celuy qui a tout fait, ie ne sçay pas le futur: mais si iamais ie me démens de cette parole, chasse-moy bien loin d'icy. Voila ce que ie demanday au Pe-

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re, & c'est cela mesme qu'on te veut donner, ouvre ta bouche, & laisse sortir nettement ce qui est caché dans ton cœur, ce pauvre homme, qui a si souvent tonné dans les assemblées de ses Gens, répondit, qu'il n'auoit point de parole que ses gens ne fussent retour-

nez de la guerre; mais on luy fit bien entendre, que s'il perdoit la parole, qu'il deuoit trouuer ses pieds; on dit le mesme à vn autre qui auoit deux femmes, qui en quita vne bien-tost apres. Bref, ils ont donné tous deux quelque esperance de leurs Conuersion: ie prie nostre Seigneur qu'il leur ouure les yeux. La superbe, qui est le plus grand vice de l'esprit, & la luxure, qui est le plus vllain peché de la chair, sont deux obstacles à la Foy, & à la vraye penitence.

F I N.

A NEW VOYAGE TO CAROLINA;

CONTAINING THE

Exact Description and Natural History

OF THAT

COUNTRY:

Together with the Present State thereof.

AND

A JOURNAL

Of a Thousand Miles, Travel'd thro' several Nations of INDIANS.

Giving a particular Account of their Customs, Manners, &c.

By JOHN LAWSON, Gent. Surveyor-General of North-Carolina

L O N D O N:

Printed in the Year 1709.

JOURNAL

OF

A thousand Miles Travel among the Indians, from South to North Carolina.



N December the 28th, 1700, I began my Voyage (for North Carolina) from Charles-Town, being six English-men in Company, with three Indian-men, and one Woman, Wife to our Indian-Guide, having five Miles from the Town to the Breach we went down in a large Canoe, that we had provided for our Voyage thither, having the Tide of Ebb along with us; which was so far spent by that Time we got down, that we had not Water enough for our Craft to go over, although we drew but two Foot, or thereabouts. This Breach is a Passage through a Marsh lying to the Northward of Sullivan's Island, the Pilot's having a Look out thereon, lying very commodious for Mariners, (on that Coast) making a good Land-Mark in so level a Country; this Bar being difficult to hit, where an Observation hath been wanting for a Day or two; North East Winds bringing great Fogs, Mists, and Rains; which, towards the cool Months of October, November, and until the latter End of March, often appear in these Parts. There are three Pilots to attend, and conduct Ships over the Bar. The Harbour where the Vessels generally ride, is against the Town on Cooper's River, lying within a Point which parts that and Ashley-River, they being Land-lock'd almost on all Sides.

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At 4 in the Afternoon, (at half Flood) we pass'd with our Canoe over the Breach, leaving Sullivan's Island on our Star-board. The first Place we design'd for, was Santee River, on which there is a Colony of French Protestants, allow'd and encourag'd by the Lords Proprietors. At Night we got to Bell's Island, a poor Spot of Land, being about ten Miles round, where liv'd (at that Time) a Bermudian, being employ'd here with a Boy, to look after a Stock of Cattle and Hogs, by the Owner of this Island. One Side of the Roof of his House was thatch'd with Palmeto-leaves, the other open to the Heavens, thousands of Musketoos, and other troublesome Insects, tormenting both Man and Beast inhabiting these Islands. The Palmeto-trees, whose Leaves growing only on the Top of the Tree, in the Shape of a Fan, and in a Cluster, like a Cabbage; this Tree in Carolina, when at its utmost Growth, is about forty or fifty Foot in Height, and two Foot through:

It's worth mentioning, that the Growth of the Tree is not perceivable in the Age of any Man, the Experiment having been often try'd in Bermudas, and elsewhere, which shews the slow Growth of this Vegetable, the Wood of it being porous and stringy, like some Canes, the Leaves thereof the Bermudians make Womens Hats, Bokeets, Baskets.

ements of Travellers (by its chalybid Quality) as black as a Coal. When we were all asleep, in the Beginning of the Night, we were awaken'd with the dinfall ft and most hideous Noise that ever pierc'd my Ears: This sudden Surprizal incapacitated us of guessing what this threatening Noise might proceed from; but our Indian Pilot (who knew these Parts very well) acquainted us, that it was customary to hear such Music along that Swamp-side, there being endless Numbers of Panthers, Tygers, Wolves, and other Beasts of Prey, which take this Swamp for their Abode in the Day, coming in whole Drovers to hunt the Deer in the Night.

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These Indians are a small People, having lost much of their former Numbers, by intestine Broils; but most by the Small-pox, which hath often visited them, sweeping away whole Towns; occasion'd by the immoderate Government of themselves in their Sickness; as I have mention'd before,

The Land in this Percearson, or Valley, being extraordinary rich, and the Runs of Water well stor'd with Fowl. It is the Head of one of the Branches of Santee-River; but a farther Discovery Time would not permit; only one Thing is very remarkable, there growing all over this Swamp, a tall, lofty Bay-tree, but is not the same as in England, these being in their Ver dure all the Winter long; which appears here, when you stand on the Ridge, (where our Path lay) as if it were one pleasant, green Field, and as even as a Bowling-green to the Eye of the Beholder; being hemm'd in on one Side with these Ledges of vast high Mountains.

Viewing the Land here, we found an extraordinary rich, black Mould, and some of a Copper-colour, both Sorts very good; the Land in some Places is much burthen'd with Iron, Stone, here being great Store of it, seemingly very good: The eviling Springs, which are many in these Parts, issuing out of the Rocks, which Water we drank of, it colouring the Ex-

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treating of the *Sewees*. Neither do I know any Savages that have traded with the *English*, but what have been great Losers by this Distemper.

We found here good Store of Chinkapin-Nuts, which they gather in Winter great Quantities of, drying them; so keep these Nuts in great Baskets for their Use; likewise Hickerie-Nuts, which they beat betwixt two great Stones, then sift them, so thicken their Venison-Broath therewith; the small Shells precipitating to the Bottom of the Pot, whilst the Kernel in Form of Flower, mixes it with the Liquor. Both these Nuts made into Meal, makes a curious Sopp, either with clear Water, or in any Meat-Broth.

From the Nation of *Indians*, until such Time as you come to the *Turkeivros* in North Carolina, you will see no long Moss upon the Trees; which Space of Ground contains above five hundred Miles. This seeming Miracle in Nature, is occasion'd by the Highness of the Land, it being dry and healthful; for tho' this moss bears a Seed in a Sort of a small Cod, yet it is generated in or near low swampy Grounds.

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Itony Brook, whose Water was of a bluish Cast, as it is for several hundreds of Miles towards the Heads of the Rivers, I suppose occasion'd by the vast Quantities of Marble lying in the Bowels of the Earth. The Springs that feed these Rivulets, lick up some Potions of the Stones in the Brooks; which Dissolution gives this Tincture, as appears in all, or most of the Rivers and Brooks of this Country, whose rapid Streams are like those in *Torkshire*, and other Northern Counties of *England*. The *Indians* talk of many Sorts of Fish which they afford, but we had not Time to discover their Species.

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abounds likewise with curious bold Creeks, (navigable for small Craft) disgorging themselves into the main Rivers, that vent themselves into the Ocean. These Creeks are well stor'd with sundry sorts of Fish, and Fowl, and are very convenient for the Transportation of what Commodities this Place may produce. This Night, we had a great deal of Rain, with Thunder and Lightning.

Next Morning, it proving delicate Weather, three of us separated ourselves from the Horses, and the rest of the Company, and went directly for *Sapona* Town. That day, we pass'd through a delicious Country, (none that I ever saw exceeds it.) We saw fine bladed Grass, six Foot high, along the Banks of these pleasant Rivulets: We pass'd by the Sepulchres of several slain *Indians*. Coming, that day, about 30 Miles, we reach'd the fertile and pleasant Banks of *Sapona* River, whereon stands the *Indian* Town and Fort. Nor could all *Europe* afford a pleasanter Stream, were it inhabited by *Christians*, and cultivated by ingenious Hands. These *Indians* live in a clear Field, about a Mile square, which they would have sold me; because I talked sometimes of coming into those Parts to

live. This most pleasant River may be something broader than the *Thames* at *Kingston*, keeping a continual pleasant warbling Noise, with its reverberating on the bright Marble Rocks. It is beautified with a numerous Train of Swans, and other sorts of Water-Fowl, not common, though extraordinary pleasing to the Eye. The forward Spring welcom'd us with her innumerable Train of small Choristers, which

Ridge of Mountains, tho' they hit the right Passage; it being no less than five days Journey through a Ledge of Rocky Hills, and sandy Defarts. And which is yet worse, there is no Water, nor force a Bird to be seen, during your Passage over these barren Crags and Valleys. The *Sapona* River proves to be the West Branch of *Cape-Fair*, or *Clarendon* River, whose Inlet, with other Advantages, makes it appear as noble a River to plant a Colony in, as any I have met withal.

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The *Sycamore*, in these Parts, grows in a low, swampy Land, by River-sides. Its Bark is quite different from the *English*, and the most beautiful I ever saw, being mottled and clouded with several Colours, as white, blue, &c. It bears no Keys but a Bar like the sweet Gum. Its Uses I am ignorant of.

inhabit those fair Banks; the Hills redoubling, and adding Sweetness to their melodious Tunes by their shrill Echoes. One side of the River is hemm'd in with mountainy Ground, the other side proving as rich a Soil to the Eye of a knowing Person with us, as any this Western World can afford. We took up our Quarters at the King's Cabin, who was a good Friend to the *English*, and had lost one of his Eyes in their Vindication. Being upon his march towards the *Appalatche* Mountains, amongst a Nation of *Indians* in their Way, there happen'd a Difference, while they were measuring of Gunpowder; and the Powder, by accident, taking fire, blew out one of this King's Eyes, and did a great deal more mischief, upon the spot: Yet this *Sapona* King stood firmly to the *English* Man's Interest, with whom he was in Company, and

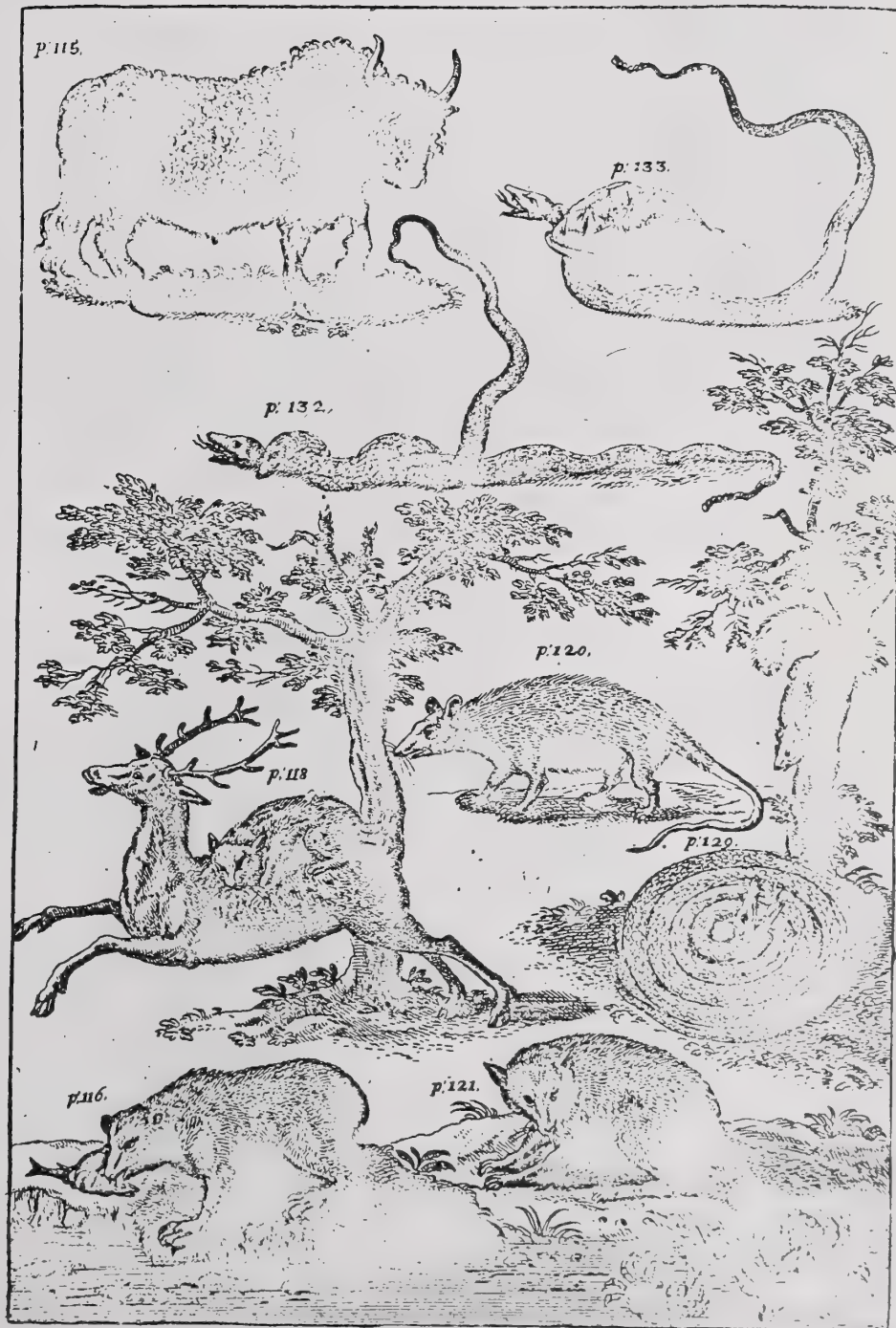
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siding with him against the *Indians*. They were intended for the *South Sea*, but were too much fatigued by the vast

All Peaches, with us, are standing; neither have we any Wall-Fruit in *Carolina*; for we have Heat enough, and therefore do not require it. We have a great many forts of this Fruit, which all thrive to Admiration, Peach-Trees coming

to Perfection (with us) as easily as the Weeds. A Peach falling on the Ground, brings a Peach-Tree that shall bear in three years, or sometime sooner. Eating Peaches in our Orchards makes them come up so thick from the Kernel, that we are forced to take a great deal of Care to weed them out; otherwise they make our Land a Wilderness of Peach-Trees.

[Facing page 115]



The Bears here are very common, though not so large as in *Greenland*, and the more Northern Countries of *Russia*. The Flesh of this Beast is very good, and nourishing, and not inferior to the best Pork in Taste. It stands betwixt Beef and Pork, and the young Cubs are a Dish for the greatest *Epicure* living. I prefer their Flesh before any Beef, Veal, Pork, or Mutton; and they look as well as they eat, their fat being as white as Snow, and the sweetest of any Creature's in the World. If a Man drink a Quart thereof melted, it never will rise in his Stomach. We prefer it above all things, to fry Fish and other things in. Those that are Strangers to it, may judge otherwise; But I who have eaten a great deal of Bears Flesh in my Life-time (since my being an Inhabitant in *America*) do think it equalizes, if not excels, any Meat I ever eat in *Europe*. The Bacon made thereof is extraordinary Meat; but it must be well saved, otherwise it will rust. This Creature feeds upon all sorts of wild Fruits.

They are seemingly a very clumsy Creature, yet are very nimble in running up Trees, and traversing every Limb thereof. When they come down, they run Tail foremost. At catching of Herrings, they are most expert Fishers. They sit by the Creek-sides, (which are very narrow) where the Fish run in; and there they take them up, as fast as it's possible they can dip their Paws into the Water. There is one thing more to be consider'd of

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this Creature, which is, that no Man, either Christian or *Indian*, has ever kill'd a She-bear with Young.

It is supposed, that the She-Bears, after Conception, hide themselves in some secret and undiscoverable Place, till they bring forth their Young, which, in all Probability, cannot be long; otherwise, the *Indians*, who hunt the Woods like Dogs, would, at some time or other, have found them out. Bear-Hunting is a great Sport in *America*, both with the *English* and *Indians*. Some Years ago, there were kill'd five hundred Bears, in two Counties of *Virginia*, in one Winter; and but two She-Bears amongst them all, which were not with Young, as I told you of the rest. The *English* have a breed of Dogs fit for this sport, about the size of Farmers Curs, and, by Practice, come to know the Scent of a Bear.

The Oil of the Bear is very Sovereign for Strains, Aches, and old Pains. The fine Fur at the bottom of the Belly, is used for making Hats, in some places. The Fur itself is fit for several Uses; as for making Muffs, facing Caps, &c. but the black Cub-skin is preferable to all sorts of that kind, for Muffs. Its Grain is like Hog-Skin.

The *Panther* is of the Cat's kind; about the height of a very large Greyhound of a reddish Colour, the same as a Lion. He climbs Trees with the greatest Agility imaginable,

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is very strong-limb'd, catching a piece of Meat from any Creature he strikes at. His Tail is exceeding long; his Eyes look very fierce and lively, are large, and of a grayish Colour; his Prey is, Swines-flesh, Deer, or any thing he can take; no Creature is so nice and clean, as this, in his Food. When he has got his Prey, he fills his Belly with the Slaughter, and carefully lays up the Remainder, covering it

the *Panther* is, and nearest to him in Bigness and Nature.

This Cat is quite different from those in *Europe*; being more nimble and fiercer, and larger; his Tail does not exceed four Inches. He makes a very odd sort of Cry in the Woods, in the Night. He is spotted as the Leopard is, tho' some of them are not, (which may happen, when their Furs are out of Season) he climbs a Tree very dexterously, and preys as the *Panther* does. He is a great Destroyer of young Swine. I knew an Island, which was posses'd by these Vermine, unknown to the Planter, who put thereon a considerable Stock of Swine; but never took one back; for the wild Cats destroy'd them all. He takes most of his Prey by Surprise, getting up the Trees, which they pass by or under, and thence leaping directly upon them. This he takes Deer (which he cannot catch by running) and fastens his Teeth into their Shoulders and sucks them. They run with him, till they fall down for want of strength, and become a Prey to the Enemy.

very neatly with Leaves, which if any thing touches, he never eats any more of it. He purrs as Cats do; if taken when Young, is never to be reclaim'd from his wild Nature. He hollows like a Man in the Woods, when kill'd, which is by making him take a Tree, as the least Cur will presently do; then the Huntsmen shoot him; if they do not kill him outright, he is a dangerous Enemy, when wounded, especially to the Dogs that approach him. This Beast is the greatest Enemy to the Planter, of any Vermine in *Carolina*. His Flesh looks as well as any Shambles-Meat: whatsoever; a great many People eat him, as choice Food; but I never tasted of a *Panther*, so cannot commend the Meat, by my own Experience. His Skin is a warm Covering for the *Indians* in Winter, though not esteem'd amongst the choice Furs. This Skin dress'd, makes fine Womens Shoes, or Mens Gloves.

The Mountain-Cat, so call'd, because he lives in the Mountainous Parts of *America*. He is a Beast of Prey, as

The Wolf of *Carolina*, is the Dog of the Woods. The *Indians* had no other Curs, before the Christians came amongst them. They are made domestick. When wild, they are neither so large, nor fierce, as the *European* Wolf. They are not Man-slayers; neither is any Creature in *Carolina*, unless wounded. They go in great Drovers in the Night, to hunt Deer, which they do as well as the best Pack of Hounds. Nay, one of these will hunt down a Deer. They are often so poor, that they can hardly run. When they catch no Prey, they go to a Swamp, and fill their Belly full of Mud; if afterwards they chance to get any thing of Flesh, they will disgorge the Mud, and eat the other. When they hunt in the Night, that there is a great many together, they make the most hideous and frightful Noise, that ever was heard. The Fur makes good Muffs. The Skin dress'd to a Parchment makes the best Drum-Heads, and if tann'd makes the best sort of Shooes for the Summer-Countries.

Tygers are never met withal in the Settlement; but are more to the Westward, and are not numerous on this Side the Chain of Mountains. I once saw one, that was larger than a Panther, and seem'd to be a very bold Creature. The *Indians* that hunt in those Quarters, say, they are seldom met withal. It seems to differ from the Tyger of *Asia* and *Africa*.

Polcats or Skunks in *America*, are different from those in *Europe*. They are thicker, and of a great many Colours; not all alike, but each differing from another in the particular Colour.

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Beyers are very numerous in *Carolina*, their being abundance of their Dams in all Parts of the Country, where I have travel'd. They are the most industrious and greatest Artificers (in building their Dams and Houses) of any four-footed Creatures in the World. Their Food is chiefly the Barks of Trees and Shrubs, viz. Sassafras, Ash, Sweet-Gum, and several others. If you take them young, they become very tame and domestick, but are very mischievous in spoiling Orchards, by breaking the Trees, and blocking up your Doors in the Night, with the Sticks and Wood they bring thither. If they eat any thing that is salt, it kills them. Their Flesh is a sweet Food; especially, their Tail, which is held very dainty. Their Fore-Feet are open, like a Dog's; their Hind-Feet webb'd like a Water-Fowl's. The Skins are good Furs for several Uses, which every one knows. The Leather is very thick; I have known Shooes made thereof in *Carolina*, which lasted well. It makes the best Hedgers Mittens that can be used.

Musk Rats frequent fresh Streams and no other; as the Bever does. He has a Cod of Musk, which is valuable, as is likewise his Fur.

The *Possum* is found no where but in *America*. He is the Wonder of all the Land-Animals, being the size of a Badger, and near that Colour. The Male's Pizzle is placed retrograde; and in time of Coition, they differ from all other Animals, turning Tail to Tail, as Dog and Bitch when ty'd. The Female, doubtless, breeds her Young at her Teats; for I have seen them stick fast thereto, when they have been no bigger than a small Raspberry, and seemingly inanimate. She has a Paunch, or false Belly, wherein she carries her Young, after they are from those Teats, till they can shift for themselves. Their Food is Roots, Poultry, or wild Fruits.

rather more unlucky than a Monkey. When wild, they are very subtle in catching their Prey. Those that live in the Salt-Water, feed much on Oysters which they love. They watch the Oyster when it opens, and nimbly put in their Paw, and pluck out the Fish. Sometimes the Oyster shuts, and holds fast their Paw till the Tide comes in, that they are drown'd, tho' they swim very well. The way that this Animal catches Crabs, which he greatly admires, and which are plenty in *Carolina*, is worthy of Remark. When he intends to make a Prey of these Fish, he goes to a Marsh, where standing on the Land, he lets his Tail hang in the Water. This the Crab takes for a Bait, and fastens his Claws therein, which as soon as the *Raccoon* perceives, he, of a sudden, springs forward, a considerable way, on the Land, and brings the Crab along with him. As soon as the Fish finds himself out of his Element, he presently lets go his hold; and then the *Raccoon* encounters him, by getting him cross-wise in his Mouth, and devours him.

They have no Hair on their Tails, but a sort of a Scale, or hard Crust, as the Beyers have. If a Cat has nine Lives, this Creature surely has nineteen; for if you break every Bone in their Skin, and mash their Skull, leaving them for Dead, you may come an hour after, and they will be gone quite away, or perhaps you meet them creeping away. They are a very stupid Creature, utterly neglecting their Safety. They

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are most like Rats of any thing. I have, for Necessity in the Wildness, eaten of them. Their Flesh is very white, and well tasted; but their ugly Tails put me out of Conceit with that Fare. They climb Trees, as the *Raccoons* do. Their Fur is not esteem'd nor used, save that the *Indians* spin it into Girdles and Garters.

The *Raccoon* is of a dark-gray Colour; if taken young, is easily made tame, but is the drunkenest Creature living, if he can get any Liquor that is sweet and strong. They are

The *Minx* is an Animal much like the *English* Fillmart or Polcat. He is long, slender, and every way shap'd like him. His Haunts are chiefly in the Marshes, by the Seaside and Salt-Waters, where he lives on Fish, Fowl, Mice, and Insects. They are bold Thieves, and will steal any thing

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from you in the Night, when asleep, as I can tell by Experience; for one Winter, by Misfortune, I ran my Vessel a-ground, and went often to the Banks, to kill wild Fowl, which we did a great many. One Night, we had a mind to sleep on the Banks (the Weather being fair) and wrapt up the Geese which we had kill'd, and not eaten, very carefully, in the Sail of a Canoe, and folded it several Doubles, and for their better Security, laid 'em all Night under my Head. In the Morning when I wak'd, a Minx had eaten thro' every Fold of the Canoe's Sail, and thro' one of the Geese, most part of which was gone. These are likewise found high up in the Rivers, in whose sides they live; which is known by the abundance of Fresh-Water Muscicle-Shells (such as you have in *England*) that lie at the Mouth of their Holes. This is an Enemy to the Tortois, whose

Holes in the Sand, where they hide their Eggs, the *Minx* finds out, and scratches up and eats. The *Raccoons* and *Crows* do the same. The *Minx* may be made domestick, and were it not for his paying a Visit now and then to the Poultry, they are the greatest Destroyers of Rats and Mice, that are in the World. Their Skins, if good of that kind, are valuable, provided they are kill'd in Season.

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Fallow-Deer in *Carolina*, are taller and longer-legg'd, than in *Europe*; but neither run so fast, nor are so well haunch'd. Their Singles are much longer, and their Horns stand forward, as the others incline backward; neither do they beam, or bear their Antlers, as the *English* Deer do. Towards the Salts, they are not generally so fat and good Meat, as on the Hills. I have known some kill'd on the Salts in *January*,

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that have had abundance of Bots in their Throat, which keep them very poor. As the Summer approaches, these Bots come out, and turn into the finest Butterfly imaginable, being very large, and having black, white, and yellow Stripes. Deer-Skins are one of the best Commodities *Carolina* affords, to ship off for *England*, provided they be large.

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The Fox, of *Carolina* is gray; but smells not as the Foxes in *Great-Britain*, and elsewhere. They have reddish Hair about their Ears, and are generally very fat; yet I never saw any one eat them. When hunted, they make a sorry Chace, because they run up Trees, when pursued. They are never to be made familiar and tame, as the *Raccoon* is. Their Furs, if in Season, are used for Muffs and other Ornaments. They live chiefly on Birds and Fowls; and such small Prey.

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The Allegator is the same, as the Crocodile, and differs only in Name. They frequent the sides of Rivers, in the Banks of which they make their Dwellings a great way under Ground; the Hole or Mouth of their Dens lying commonly two Foot under Water, after which it rises till it be considerably above the Surface thereof. Here it is, that this

rest of their impenetrable Armour. They roar, and make a hideous Noise against bad Weather, and before they come out of their Dens in the Spring. I was pretty much frightened with one of these once; which happened thus: I had built a House about half a Mile from an *Indian* Town, on the Fork of *New-River*, where I dwelt by my self, expecting a young *Indian* Fellow, and a Bull-Dog, that I had along with me. I had not then been so long a Sojourner in *America*, as to be thoroughly acquainted with this Creature. One of them had got his Nest directly under my House, which stood on pretty high Land, and by a Creek-side, in whose Banks his Entering-place was, his Den reaching the Ground directly on which my House stood. I was sitting alone by the Fire-side (about nine a Clock at Night, some time in *March*) the *Indian* Fellow being gone to the Town, to see his Relations; so that there was no body in the House but my self and my Dog; when, all of a sudden, this ill-favour'd Neighbour of mine, set up such a Roaring, that he

amphibious Monster dwells all the Winter, sleeping away his time till the Spring appears, when he comes from his Cave, and daily swims up and down the Streams. He always breeds in some fresh Stream, or clear Fountain of Water, yet seeks his Prey in the broad Salt Waters, that are brackish, not on the Sea-side, where I never met with any. He never devours Men in *Carolina*, but uses all ways to avoid them, yet he kills Swine and Dogs, the former as they come to feed in the Marshes, the others as they swim over the Creeks and Waters. They are very mischievous to the

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Wares made for taking Fish, into which they come to prey on the Fish that are caught in the Ware, from whence they cannot readily extricate themselves, and so break the Ware in Pieces, being a very strong Creature. This Animal, in these Parts, sometimes exceeds seventeen Foot long. It is impossible to kill them with a Gun, unless you chance to hit them about the Eyes, which is a much sorer Place, than the

made the House shake about my Ears, and so continued, like a Bittern, (but a hundred times louder, if possible) for four or five times. The Dog stared, as if he was frightened out of his Senses; nor indeed, could I imagine what it was, having never heard one of them before. Immediately again I had another Lesson; and so a third. Being at that time amongst none but Savages, I began to suspect, they were working some Piece of Conjurat[i]on under my House, to get away my Goods; not but that, at another time, I have as little Faith in their, or any others working Miracles, by diabolical Means, as any Person living. At last, my Man came in, to whom when I had told the Story, he laugh'd at me, and presently undeceiv'd me, by telling me what it was that made that Noise. These Allegators lay Eggs, as the Ducks do; only they are longer shap'd, larger, and a thicker Shell, than they have. How long they are in hatching, I cannot

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tell; but, as the *Indians* say, it is most part of the Summer, they always lay by a Spring-Side, the young living in and about the same, as soon as hatch'd. Their Eggs are laid in Nests made in the Marshes, and contain twenty or thirty Eggs. Some of these Creatures afford a great deal of Musk. Their Tail, when cut off, looks very fair and white, seemingly like the best of Veal. Some People have eaten thereof, and say, it is delicate Meat, when they happen not to be musky. Their Flesh is accounted proper for such as are troubled with the lame Distemper, (a sort of Rheumatism) so is the Fat very prevailing to remove Aches and Pains, by Unction. The Teeth of this Creature, when dead, are taken out, to make Chargers for Guns, being of several Sizes, fit for all Loads. They are white, and would make pretty Snuff-Boxes, if wrought by an Artist. After the Tail of the Allegator is separated from the Body, it will move very freely for four days.

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The Rattle-Snakes are accounted the peaceablest in the World; for they never attack any one, or injure them, unless they are tied upon, or molested. The most Danger of being bit by these Snakes, is for those that survey Land in *Carolina*; yet I never heard of any Surveyor that was kill'd, or hurt by them. I have myself gone over several of this Sort, and others; yet it pleas'd God, I never came to any harm. They have the Power, or Art (I know not which to call it) to charm Squirrels, Hares, Partridges, or any such thing, in such a manner, that they run directly into their Mouths. This I have seen by a Squirrel and one of these Rattle-Snakes; and other Snakes have, in some measure, the same Power. The Rattle-Snakes have many small Teeth, of which I cannot see they make any use; for they swallow every thing whole; but the Teeth which poison, are only four; two on each side of their Upper-Jaws. These are bent like a Sickle, and hang loose as if by a Joint. Towards the setting on of these, there is, in each Tooth, a little Hole, wherein you may just get in the Point of a small Needle. And here it is, that the Poison comes out, (which is as green as Grass) and follows the Wound, made by the Point of their Teeth. They are much more venomous in the Months of *June* and *July*, than they are in *March*, *April* or *September*. The hotter the Weather, the more poisonous. Neither may we suppose, that they can renew their Poison as oft as they will; for we have had a Person bit by one of these, who never rightly recover'd it, and very hardly

escaped with Life; a second Person bit in the same Place by the same Snake, and receiv'd no more Harm, than if bitten with a Rat.

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Of Frogs we have several sorts; the most famous is the Bull-Frog, so call'd, because he lows exactly like that Beast, which makes Strangers wonder (when by the side of a Marsh) what's the matter, for they hear the Frogs low, and can see no Cattle; he is very large. I believe, I have seen one with as much Meat on him, as a Pullet, if he had been dress'd. The small green Frogs get upon Trees, and make a Noise. There are several other colour'd small Frogs; but the Common Land-Frog is likest a Toad, only he leaps, and is not poisonous. He is a great Devourer of Ants, and the Snakes devour him. These Frogs baked and beat to Powder, and taken with Orrice-Root cures a Tympany.

The long, black Snake frequents the Land altogether, and is the nimblest Creature living. His Bite has no more Venom, than a Prick with a Pin. He is the best Mousetrapp

can be; for he leaves not one of that Vermine alive, where he comes. He also kills the Rattle-Snake, wheresoever he meets him, by twisting his Head about the Neck of the Rattle-Snake, and whipping him to Death with his Tail. This Whipster haunts the Dairies of careless Housewives, and never misses to skim the Milk clear of the Cream. He is an excellent Egg-Merchant, for he does not suck the Eggs, but swallows them whole (as all Snakes do.) He will often swallow all the Eggs from under a Hen that sits, and coil himself under the Hen, in the Nest, where sometimes the Housewife finds him. This Snake, for all his Agility, is so brittle, that when he is pursued, and gets his Head into the Hole of a Tree, if any body gets hold of the other end, he will twist, and break himself off in the middle. One of these Snakes, whose Neck is no thicker than a Woman's little Finger, will swallow a Squirrel; so much does that part stretch, in all these Creatures.

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Tortoises, vulgarly call'd Turtle; I have rank'd these a-

among the Insects, because they lay Eggs, and I did not know well where to put them. Among us there are three sorts. The first is the green Turtle, which is not common, but is sometimes found on our Coast. The next is the Hawks-bill, which is common. These two sorts are extraordinary Meat. The third is Logger-Head, which Kind scarce any one covets, except it be for the Eggs, which of this and all other Turtles, are very good Food. None of these sorts of Creatures Eggs will ever admit the White to be harder than a Jelly; yet the Yolk, with boiling, becomes as hard as any other Egg.

The Land-Terebin is of several Sizes, but generally Round-Mouth'd, and not Hawks-Bill'd, as some are. The *Indians* eat them. Most of them are good Meat, except the very large ones; and they are good Food too, provided they are not Musky. They are an utter Enemy to the Rattle-Snake, for when the Terebin meets him, he catches hold of him a little below his Neck, and draws his Head into his Shell, which makes the Snake beat his Tail, and twist about with all the Strength and Violence imaginable, to get away; but the Terebin soon dispatches him, and there leaves him. These they call in Europe the Land Tortois; their Food is Snails, Tad-pools, or young Frogs, Mushrooms, and the Dew and Slime of the Earth and Ponds.

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As the Eagle is reckon'd the King of Birds I have begun with him. The first I shall speak of, is the bald Eagle; so call'd, because his Head, to the middle of his Neck, and his Tail, is as white as Snow. These Birds continually breed the Year round; for when the young Eagles are just down'd, with a sort of white woolly Feathers, the Hen-Eagle lays again, which Eggs are hatch'd by the Warmth of the young ones in the Nest, so that the Flight of one Brood makes Room for the next, that are but just hatch'd. They prey on any living thing they can catch. They are heavy of Flight, and cannot get their Food by Swiftnes, to help which there is a Fishhawk that catches Fishes, and suffers the Eagle to take them from her, although she is long-wing'd and a swift Flyer, and can make far better way in her Flight than the Eagle can. The bald Eagle attends the Gunners in Winter, with all the Obsequiousness imaginable, and when he shoots and kills any Fowl, the Eagle surely comes in for his Bird; and besides, those that are wounded, and escape the Fowling, fall to the Eagle's share. He is an excellent Artist at stealing young Pigs, which Prey he carries alive to his Nest, at which time the poor Pig makes such a Noise over Head, that Strangers that have heard them cry, and not seen the Bird and his Prey, have thought there were Flying Sows and Pigs in that Country. The Eagle's Nest is made of Twigs, Sticks and Rubbish. It is big enough to fill a handsome Carts Body, and commonly so full of nasty Bones and Carcasses that it stinks most offensively. This Eagle is not bald, till he is one or two years old.

The gray Eagle is altogether the same sort of Bird, as the Eagle in Europe; therefore, we shall treat no farther of him.

The Fishing-Hawk is the Eagle's Jackal, which most commonly, (though not always) takes his Prey for him. He is a

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large Bird, being above two thirds as big as the Eagle. He builds his Nest as the Eagles do; that is, in a dead Cypress-Tree, either standing in, or hard by, the Water. The Ea-

land; only these differ in their Tails, which are very long, much like a Parrakeeto's? You must understand, that these

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Birds do not breed amongst us, (who are settled at, and near the Mouths of the Rivers, as I have intimated to you before) but come down (especially in hard Winters) amongst the Inhabitants, in great Flocks, as they were seen to do in the Year 1707, which was the hardest Winter that ever was known, since *Carolina* has been seated by the Christians. And it that Country had such hard Weather, what must be expected of the severe Winters in *Pennsylvania*, *New-York*, and *New-England*, where Winters are ten times (if possible) colder than with us. Although the Flocks are, in such Extremities, very numerous; yet they are not to be mention'd in Comparison with the great and infinite Numbers of these Fowl, that are met withal about a hundred, or a hundred and fifty, Miles to the Westward of the Places where we at

gle and this Bird seldom sit on a living Tree. He is of a gray pied Colour, and the most dexterous fowl in Nature at Catching of Fish, which he wholly lives on, never eating any Flesh.

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The Woodcocks live and breed here, though they are not in great plenty, as I have seen them in some Parts of *England*, and other Places. They want one third of the *English* Woodcock in Bigness; but differ not in Shape, or Feather, save that their Breast is of a Carnation Colour; and they make a Noise (when they are on the Wing) like the Bells about a Hawk's Legs. They are certainly as dainty Meat,

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Our wild Pigeons, are like the Wood-Quee or Stock-Doves, only have a longer Tail. They leave us in the Summer. This sort of Pigeon (as I laid before) is the most like our Stock-Doves, or Wood-Pigeons that we have in *Eng-*

present live; and where these Pigeons come down, in quest of a small sort of Acorns, which in those Parts are plentifully found. They are the same we call Turkey-Acorns, because the wild Turkeys feed very much thereon; And for the same Reason, those Trees that bear them, are call'd Turkey-Oaks. I saw such prodigious Flocks of these Pigeons, in January or February, 1701-2, (which were in the hilly Country, between the great Nation of the *Esaw Indians*, and the pleasant Stream of *Sapona*, which is the West-Branch of *Clarendon*, or *Cape-Fair River*) that they had broke down the Limbs of a great many large Trees all over those Woods, whereon they chanced to sit and roost; especially the great Pines, which are a more brittle Wood, than our sorts of Oak are. These Pigeons, about Sun-Rise, when we were preparing to march on our Journey, would fly by us in such vast Flocks, that they would be near a Quarter of an Hour, before they were all pass'd by; and as soon as that Flock was gone, another would come; and so successively one after another, for great part of the Morning. It is observable, that wherever these Fowl come in such Numbers, as I saw them then, they clear all before them, scarce leaving one Acorn upon the Ground, which would, doubtless, be a great Prejudice to the Planters that should seat there, because their Swine would be thereby depriv'd of their Mast. When I saw such Flocks of the Pigeons I now speak of, none of our Company had any other sort of Shot, than that which is cast in Moulds, and was so very large, that we could not put above ten or a

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dozen of them into our largest Pieces; Wherefore, we made but an indifferent Hand of shooting them; although we commonly kill'd a Pigeon for every Shot. They were very fat, and as good Pigeons, as ever I eat. I enquired of the *Indians* that dwell'd in those Parts, where it was that those Pigeons bred, and they pointed towards the vast Ridge of Mountains, and said, they bred there. Now, whether they make their Nests in the Holes in the Rocks of those Mountains, or build in Trees, I could not learn; but they seem to me to be a Wood-Pigeon, that build in Trees, because of their frequent sitting thereon, and their Roosting on Trees always at Night, under which their Dung commonly lies half a Foot thick, and kills every thing that grows where it falls.

Turtle Doves are here very plentiful; they devour the Pease; for which Reason, People make Traps and catch them.

The Parrakeetos are of a green Colour, and Orange-Colour'd half way their Head. Of these and the Allegators, there is none found to the Northward of this Province. They visit us first, when Mulberries are ripe, which Fruit they love extremely. They peck the Apples, to eat the Kernels, so that the Fruit rots and perishes. They are mischievous to Orchards. They are often taken alive, and will become familiar and tame in two days. They have their Nests in hollow Trees, in low, swampy Ground. They devour the Birch-Buds in April, and lie hidden when the Weather is frosty and hard.

The Thrushes in *America*, are the same as in *England*, and red under the Wings. They never appear amongst us but in hard Weather, and presently leave us again.

Of Wood-peckers, we have four sorts. The first is as big as a Pigeon, being of a dark brown Colour, with a white Cross on his Back, his Eyes circled with white, and on his

on the other side the Tree, from your sight; and so dodges you for a long time together. He is about the size of an *English* Lark.

The Mocking-Bird is about as big as a Throistle in *England*, but longer; they are of a white, and gray Colour, and are held to be the Choristers of *America*, as indeed they are. They sing with the greatest Diversity of Notes, that is possible for a Bird to change to. They may be bred up, and will sing with us tame in Cages; yet I never take any of their Nests, altho' they build yearly in my Fruit-Trees, because I have their Company, as much as if tame, as to the singing Part. They often sit upon our Chimneys in Summer, there being then no Fire in them, and sing the whole Evening and most part of the Night. They are always attending our Dwellings; and feed upon Mulberries and other Berries and Fruits; especially the *Mechoacum-berry*, which grows here very plentifully.

Head stands a Tuft of beautiful Scarlet Feathers. His Cry is heard a long way; and he flies from one rotten Tree to another, to get Grubs, which is the Food he lives on.

The second sort are of an Olive-Colour, striped with yellow. They eat Worms as well as Grubs, and are about the Bigness of those in *Europe*.

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The third is the same Bigness as the last; he is pied with black and white, has a Crimson Head, without a Topping, and is a Plague to the Corn and Fruit; especially, the Apples. He opens the Covering of the young Corn, so that the Rain gets in, and rots it.

The fourth sort of these Wood-peckers, is a black and white speckled, or mottled; the finest I ever saw. The Cock has a red Crown; he is not near so big as the others; his Food is Grubs, Corn, and other creeping Insects. He is not very wild, but will let one come up to him; then shifts

The great gray Gulls are good Meat, and as large as a Pullet. They lay large Eggs, which are found in very great Quantities, on the Islands in our Sound, in the Months of *June*, and *July*. The young Squabs are very good Victuals, and often prove a Relief to Travellers by Water, that have spent their Provisions.

Old Wives are a black and white pied Gull with extraordinary long Wings, and a golden colour'd Bill and Feet. He makes a dismal Noise, as he flies, and ever and anon dips his Bill in the Salt-Water. I never knew him eaten.

The Sea-Cock is a Gull that crows at Break of Day, and, in the Morning, exactly like a Dunghill Cock, which Cry seems very pleasant in those uninhabited Places. He is never eaten.

We have another Duck that stays with us all the Summer. She has a great Topping, is pied, and very beautiful. She builds her Nest in a Wood-pecker's Hole, very often sixty or seventy Foot high.

Towards the Mountains in the hilly Country, on the West-Branch of *Caip-Fair* Inlet, we saw great Flocks of pretty pied Ducks, that whistled as they flew, or as they fed. I did not kill any of them.

We kill'd a curious sort of Ducks, in the Country of the *Esa-Indians*, which were of many beautiful Colours. Their Eyes were red, having a red Circle of Flesh for their Eyelids; and were very good to eat.

The Blue-Wings are less than a Duck, but fine Meat. These are the first Fowls that appear to us in the Fall of the Leaf, coming then in great Flocks, as we suppose, from *Canada*, and the Lakes that lie behind us.

Raft-Fowl includes all the sorts of small Ducks and Teal, that go in Rafts along the Shoar, and are of several sorts, that we know no Name for.

These are a whitish Fowl, about the Bigneis of a Brant; they come to us after *Christmas*, in very great Flocks, in all our Rivers. They are a very good Meat, but hard to kill, because hard to come near. They will dive and endure a great deal of Shot.

Red-Heads, a lesser Fowl than Bull-Necks, are very sweet Food, and plentiful in our Rivers and Creeks.

Tropick-Birds are a white Mew, with a forked Tail. They are so call'd, because they are plentifully met withal under the Tropicks, and thereabouts.

The Pellican of the Wilderness cannot be the same as ours; this being a Water-Fowl, with a great natural Wen or Pouch under his Throat, in which he keeps his Prey of Fish, which is what he lives on. He is Web-footed, like a Goose, and shap'd like a Duck, but is a very large Fowl, bigger than a Goose. He is never eaten as Food; They make Tobacco-pouches of his Maw.

Cormorants are very well known in some Parts of *England*; we have great Flocks of them with us, especially against the Herrings run, which is in *March* and *April*; then they sit upon Logs of dry Wood in the Water, and catch the Fish.

The Gannet is a large white Fowl, having one Part of his Wings black; he lives on Fish, as the Pellican. His Fat or Grease, is as yellow as Saffron, and the best thing known, to

I never heard but of one found on this Coast, which was near *Curruick*-Inlet.

The other sorts are of a prodigious Bigneis. Of these the Bone and Oil is made; the Oil being the Blubber, or oily Flesh, or Fat of that Fish boil'd. These differ not only in Colour, some being pied, others not, but very much in shape, one being call'd a Bottle-Nosed Whale, the other a Shovel-Nose, which is as different as a Salmon from a Sturgeon. These Fish seldom come ashore with their Tongues in their Heads, the Thrasher (which is the Whale's mortal Enemy, wherefoever he meets him) eating that out of his Head, as soon as he and the Sword-Fish have kill'd him.

The Diver-Fish lies at some of our Inlets, and, as near as I can describe him, is shap'd like a Skate, or Stingray; only he has on his Head a Pair of very thick strong Horns, and is of a monstrous Size, and Strength; for this Fish has been known to weigh a Sloop's Anchor, and run with the Vessel a League

preserve Fire-Arms, from Rust.
Shear-Waters are a longer Fowl than a Duck; some of them lie on the Coast, whilst others range the Seas all over.

Whales are very numerous, on the Coast of North *Carolina*, from which they make Oil, Bone, &c. to the great Advantage of those inhabiting the Sand-Banks, along the Ocean, where these Whales come ashore, none being struck or kill'd with a Harpoon in this Place, as they are to the Northward, and elsewhere; all those Fish being found dead on the Shoar, most commonly by those that inhabit the Banks, and Sea-side, where they dwell, for that Intent, and for the Benefit of Wrecks, which sometimes fall in upon that Shoar.

Of these Monsters there are four sorts; the first, which is most choice and rich, is the *Sperma Ceti* Whale, from which the *Sperma Ceti* is taken. These are rich Prizes; but

or two, and bring her back, against Tide, to almost the same Place. Doubtless, they may afford good Oil; but I have no Experience of any Profits which arise from them.

The Sword-Fish is the other of the Whale's Enemies, and joins with the Thrasher to destroy that Monster. After they have overcome him, they eat his Tongue, as I said before, and the Whale drives ashore.

Crampois is a large Fish, and by some accounted a young Whale; but it is not so; neither is it more than twenty five or thirty Foot long. They spout as the Whale does, and when taken yield good Oil.

Bottle-Noses are between the Crampois and Porpois, and lie near the Soundings. They are never seen to swim leisurely, as sometimes all other Fish do, but are continually running after their Prey in Great Shoals, like wild Horses, leaping now and then above the Water. The French esteem them good Food, and eat them both fresh and salt.

Porpoises are frequent, all over the Ocean and Rivers that are salt; nay, we have a Fresh-Water Lake in the great Sound of North Carolina that has Porpoises in it.

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Trouts of the Salt-Water are exactly shaped like the Trouts in Europe, having blackish, not red Spots. They are in the Salts, and are not red within, but white, yet a very good Fish. They are so tender, that if they are in or near fresh Water, and a sudden Frost come, they are benumm'd, and float on the Surface of the Water, as if dead; and then

they take up Canoe-Loads of them. If you put them into warm Water, they presently recover.

The Crocus is a Fish, in Shape like a Pearch, and in Taste like a Whiting. They croak and make a Noise in your Hand, when taken with Hook or Net. They are very good.

Infinite numbers of other Species will be hereafter discover'd as yet unknown to us; although I have seen and eaten of several other sorts of Fish, which are not here mentioned, because, as yet, they have no certain Names assign'd them. Therefore, I shall treat no farther of our Salt-Water Fish, but proceed to the Fresh.

The first of these is the Sturgeon, of which we have Plenty. all the fresh Parts of our Rivers being well stor'd therewith.

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The Indians have another way to take them, which is by Nets at the end of a Pole. The Bones of these Fish make good Nutmeg-Graters.

DISCOVERIES

IN THE RUINS OF,

NINEVEH AND BABYLON;

WITH TRAVELS IN ARMENIA, KURDISTAN AND THE DESERT:

BEING THE RESULT OF A SECOND EXPEDITION

UNDERTAKEN FOR

THE TRUSTEES OF THE BRITISH MUSEUM.

BY AUSTEN H. LAYARD, M.P.
AUTHOR OF "NINEVEH AND ITS REMAINS."



"For thou hast made of a city an heap; of a fenced city a ruin: a

palace of strangers to be no city: it shall never be built." — ISAIAH. XLV. 2.

WITH MAPS, PLANS, AND ILLUSTRATIONS.

LONDON:

JOHN MURRAY, ALBEMARLE STREET.

1853.

The Author reserves to himself the right of authorising a Translation of this Work.

We found the Howar much cast down and vexed by his recent misfortunes. The chiefs of the tribe were with him, in gloomy consultation over their losses. A Bedouin, wrapped in his ragged cloak, was seated listlessly in the tent. He had been my guest the previous evening at Nimroud, and had announced himself on a mission from the Shammar to the Tai, to learn the breed of the mares which had been taken in the late conflict. His message might appear, to those ignorant of the customs of the Arabs, one of insult and defiance. But he was on a common errand, and although there was blood between the tribes, his person was as sacred as that of an ambassador in any civilised community.

Whenever a horse falls into the hands of an Arab, his first thought is how to ascertain its descent. If the owner be dismounted in battle, or if he be even about to receive his death-blow from the spear of his enemy, he will frequently exclaim, "O Fellan! (such a one) the mare that fate has given to you, is of noble blood. She is of the breed of Saklawiyah and her dam is ridden by Awaith, a sheikh of the Fedhan" (or as the case may be). Nor will a lie come from the mouth of a Bedouin as to the race of his mare. He is proud of her noble qualities, and will testify to them as he dies. After a battle or a foray, the tribes who have taken horses from the enemy will send an envoy to ask their breed, and a person so chosen passes from tent to tent unharmed, hearing from each man, as he eats his bread, the descent and qualities of the animal he may have lost.

Amongst men who attach the highest value to the pure blood of their horses, and who have no written pedigree, for amongst the Bedouins documents of this kind do not exist, such cus-

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tom^s are necessary. The descent of a horse is preserved by tradition, and the birth of a colt is an event known to the whole tribe. If a townsman or stranger buy a horse, and is desirous of having written evidence of its race, the seller, with his friends, will come to the nearest town to testify before a person specially qualified to take the evidence, called "the cadi of the horses," who makes out a written pedigree, accompanied by various prayers and formularies from the Koran used on such occasions, and then affixes to it his seal. It would be considered disgraceful to the character of a true Bedouin to give false testimony on such an occasion, and his word is usually received with implicit confidence.

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It was the mound of Babel, better known to travellers as the Mujelibé, a name not now given to it by the Arab inhabitants of the surrounding country.

This is the first great ruin seen on approaching ancient Babylon from the north. Beyond it long lines of palms hem in the Euphrates, which now winds through the midst of the ancient city. To the vast mound of Babel succeed long undulating heaps of earth, bricks, and pottery. A solitary mass of brickwork, rising from the summit of the largest mound, marks the remains known to the Arabs as the "Mujelibé," or the "overturned."*

Other shapeless heaps of rubbish cover for many an acre the face of the land. The lofty banks of ancient canals fret the country like natural ridges of hills. Some have long been choked with sand; others still carry the waters of the river to distant villages and palm groves. On all sides, fragments of glass, marble, pottery, and inscribed brick are mingled with that peculiar nitrous and blanched soil, which, bred from the remains of ancient habitations, checks or destroys vegetation, and renders the site of Babylon a naked and hideous waste. Owls start from the scanty thickets.

to the interior or exterior of a palace. I sought in vain for some clue to the general plan of the edifice. The bricks are of a pale yellow color, and are not exceeded in quality by any found in the ruins of Babylonia. They are as firmly bound together by a fine lime cement, as those at the Birs Nimroud, and cannot be separated entire. Upon nearly every brick is clearly and deeply stamped the name and titles of Nebuchadnezzar, and the inscribed face is always placed downwards. This wonderful piece of masonry is so perfect, and so fresh in color, that it seems but the work of yesterday, although it is undoubtedly part of a building which stood in the midst of old Babylon.

This ruin has for ages been the mine from which the builders of cities rising after the fall of Babylon have obtained their materials. To this day there are men who have no other trade than that of gathering bricks from this vast heap and taking them for sale to the neighbouring towns and villages, and even to Baghdad. There is scarcely a house in Hillah which is not almost entirely built with them; and as the traveller passes through

and the foul jackall skulls through the furrows. Truly "the glory of kingdoms and the beauty of the Chaldees' excellency is as when God overthrew Sodom and Gomorrah. Wild beasts of the desert lie there; and their houses are full of doleful creatures; and owls dwell there, and satyrs dance there. And the wild beasts of the islands cry in their desolate houses, and dragons in their pleasant palaces," for her day has come.†

A few black tents and flocks of sheep and camels were scattered over the yellow plain. They belonged chiefly to the Zobeide, an ancient tribe, renowned in the history of the conquering Arabs under their first caliphs, and now pasturing their flocks in the wilds of Babylonia.‡ From Amran, the last of the great mounds, a broad and well-trodden track winds through thick groves of palms. About an hour's ride beneath pleasant shade brings the traveller to the falling gateway of the town of Hillah.

506 Piers, buttresses, and pilasters may be traced; but the work of destruction has been too complete to allow us to determine whether they belong

the narrow streets, he sees in the walls of every hovel a record of the glory and power of Nebuchadnezzar.

To obtain these materials, the masonry which had withstood the decay of ages has been gradually destroyed, until only the present shapeless mass remains, whilst the heap itself has been tunnelled in every direction in search of such entire brickwork as may still exist beneath the surface. This process having now gone on for centuries, the ruin has been more fully explored than it could possibly be by any stranger with limited time and means at his command. Those who had been engaged from childhood in this brick-trade, assured me that no sculptures or inscribed slabs had been discovered in their time, and that no remains of stone walls existed in any part of the mound. The tunnels explored by my workmen led to nothing but solid brick-masonry. The subterranean passage described by Rich† still exists, but so completely filled with rubbish, that I was unable to

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clear it entirely during my residence at Hillah. It is not more than seven feet high, and looks like an enormous drain rather than an entrance to a great building.

A large number of the fragments of brick found in this ruin are covered with a thick enamel or glaze. The colors have resisted the effects of time, and preserve their original brightness. Parts of figures and ornaments may still be traced on many specimens. The principal colors are a brilliant blue, red, a deep yellow, white, and black.* We learn from ancient authors that the walls of the palaces of Babylon were painted with the figures of men and animals, and there can be no doubt that these enamelled bricks are from the walls of an edifice. In the last century De Beauchamp, a French traveller, was told that a chamber with walls of varnished bricks had been discovered in this very mound, and that upon the sides of one of them were depicted figures of a cow and of the sun and moon, a story to which some credit may be attached, as these emblems are now known to be Assyro-Babylonian. I searched in vain, however, for some traces of them. Fragments of glass, Babylonian gems and cylinders, small bronze figures, and other relics of this nature are occasionally found on the mound by the Arabs, and are bought by the Jews of Hillah, who sell them again to European travellers.

The huge lion described by Rich† and seen by De Beauchamp, still exists half buried in the rubbish. The animal stands over a man with outstretched arms, which has led some imaginative travellers to see in the group a representation of Daniel in the lions' den. The figures are in black basalt, either so barbarously executed as to show very little progress in art, or left unfinished by the sculptor. It would scarcely be worth removal.

Near the northern edge of the ruin is the solitary tree Athelé, well-known to the Arabs, and the source of various traditions. It is said to have stood in the hanging gardens of Babylon, and to have been saved by God from the general destruction which overwhelmed the impious city, that Ali might tie his horse to its trunk after the defeat of the enemies of the Prophet in the great battle of Hillah. No other tree of the same kind exists, according to the same tradition, in the whole world.

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Since that time the labors of English scholars, and especially of Col. Rawlinson and Dr. Hincks, and of M. de Cauley, and other eminent investigators on the Continent, have nearly led to the fulfilment of those anticipations; and my present work would be incomplete were I not to give a general sketch of the results of their investigations, as well as of my own researches.

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To Sir David Brewster I am indebted for the following very interesting and valuable notes on the Ancient Glass found at Nineveh: —

"The different kinds of glass in common use consist of sand or siliceous combined, by fusion, with earths, or alkalies, or metals, which either act as fluxes, or communicate different colors or different degrees of lustre, or refractive power, to the combination. In quartz, or rock crystal, which is pure siliceous, and in other regularly crystallised bodies, their molecules or atoms unite in virtue of regular laws, the pole of one atom uniting with the similar pole of another. Such substances, therefore, do not decompose under the ordinary action of the elements. The lens of rock crystal, for example, found by Mr. Layard at Nineveh, is as sound as it was many thousand years ago, when in the form of a crystal.

No atom of the flux, or other ingredient, may be less firmly united to an atom of siliceous in one place than in another, depending on the degree of heat by which they were united, or upon the relative position of the crystalline poles of the atoms themselves when combined. There are some remarkable cases where flint glass, without any rude exposure to the elements, has become opaque;

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and we have seen specimens in which the disintegration of the same kind of glass has commenced a few years after it was made. In general, however, the process of decomposition is very slow, excepting in stables, where the presence of ammonia hastens the decomposition, and produces upon its surface all the beautiful colors of the soap bubble.

"It is, however, from among the ruins of ancient buildings that glass is found in all the stages of disintegration: and there is, perhaps, no material body that ceases to exist with so much grace and beauty, when it surrenders itself to time and not to disease. In damp localities, where acids and alkalies prevail in the soil, the glass rots, as it were, by a process which it is difficult to study. It may be broken between the fingers of an infant, and in this state we generally find in the middle of it a fragment a thin fibre of the original glass which has not yielded to the process of decay.

"In dry localities, where Roman, Greek, and Assyrian glass has been found, the process of decomposition is exceedingly interesting, and its results singularly beautiful. At one or more points in the surface of the glass the decomposition begins. It extends round that point in a spherical surface, so that the first film is a minute hemispherical one of exceeding thinness.

PROCEEDINGS

OF

THE AMERICAN ASSOCIATION

FOR THE

ADVANCEMENT OF SCIENCE.

THIRD MEETING,

HELD AT CHARLESTON, S. C., MARCH, 1850.

[Volume III]

PUBLISHED BY THE LIBERILITY OF THE CORPORATION OF CHARLESTON.

CHARLESTON, S. C.

STEAM-POWER PRESS OF WALKER AND JAMES.

1850.

Observations on a remarkable exudation of Ice from the Stems of Vegetables, and on a singular protrusion of Icy columns from certain kinds of Earth during frosty weather; by JOHN LE CONTE, M.D., Professor of Natural Philosophy and Chemistry, in the University of Georgia.

It is certainly a remarkable circumstance, that phenomena so striking as those forming the subject of this paper, have received so little attention from philosophers; and it is, perhaps, still more singular, that, hitherto, no attempts have been made at their explanation. STEPHEN ELLIOTT, in his "Sketch of the Botany of South-Carolina and Georgia," published in 1824, notices a remarkable protrusion of crystalline fibres of ice from the stems of the *Conyza bifrons*, (Vol. 2, p. 322.) SIR JOHN F. W. HERSCHEL published a short notice of a similar exudation of icy fringes occurring around thistle-stalks, and stumps of heliotropes, in the London and Edinburgh Philosophical Magazine, for 1833, p. 110, (3d Series, vol. 2, p. 110.) Professor S. P. RIGAUD, of Oxford, notices the occurrence of an analogous phenomenon on a recently built stone wall, in the succeeding number of the same journal, (3d Series, vol. 2, p. 190-1833.) As far as my researches extend, the above-mentioned notices—all of them very brief and imperfect—embrace all the observations hitherto made on these remarkable phenomena. Even the natural speculative tendency has been held in check by the extreme paucity of facts and observations; so that no explanation of them has been advanced.

For many years, my attention has been drawn to the remarkable deposition of ice around the stalks of certain plants, as well as to analogous phenomena exhibited by certain kinds of soil. During a visit to the sea-coast of Georgia, in the months of November and December, 1848, I had a very favorable opportunity of studying the phenomena as exhibited in vegetables. The plants in which I have

observed it, are two species of the genus *Pluchea* of Decandolle, or *Conyza* of the older botanists, viz: *Pluchea bifrons*, and *P. camphorata*. It is more common and conspicuous in the former species than the latter. Both of these plants grow abundantly in wet soils, around ponds, and along the road-side ditches, in the low country of Carolina and Georgia. The root is perennial, but the stem is annual and herbaceous.

The exudations of ice are most abundant and striking during the

first clear frosty weather in November and December. At this period the earth is warm, and the serenity of the atmosphere is so favorable to radiation, that there is a remarkable difference between the temperature of the day and night. When the temperature sinks, towards daylight, to about 30° or 28° of Fahrenheit, or even lower, the surface of the ground is totally devoid of the slightest incrusting film of frozen earth, while hoar-frost is deposited in such profusion on all dead vegetable matter, as to resemble a slight fall of snow. Under such circumstances, the traveller who passes along the level roads of this region soon after sunrise, cannot fail to be struck with the remarkable accumulations of voluminous friable masses of semi-pellucid ice around the foot-stalks of the *Pluchea*, which grow along the road-side ditches. At a distance they present an appearance resembling locks of cotton-wool, varying from four to five inches in diameter, placed around the roots of the plants; and when numerous, the effect is striking and beautiful.

In relation to the exudation of ice from the stems of vegetables, the description and delineation given by Sir JOHN HERSCHEL are so clear and faithful, and accord so exactly with the results of my own observations, that I prefer using the language of that justly distinguished philosopher, whenever it suits my purpose. The engraving which accompanies his paper represents the appearance presented very accurately. My observations appear to establish the following facts in relation to this phenomenon:

1. The depositions of ice are entirely confined to the immediate neighborhood of the roots of the plants, the upper parts of the tall unbroken stalks being quite free from them. They frequently commence two or three inches from the ground, and extend from three to four inches along the axis of the stem. (*Fig. A.*) It is proper to state that, at this season, the stalks are dead, and quite dry to within about six inches of the earth, below which they are generally green and succulent.

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The additional facts which my observations establish—particularly in relation to the recurrence of the phenomenon on the same portion of the stalk during several successive frosts, even after it had been cut off—appear to be irreconcilable with the idea that the physiological functions of the plant have any share in the production of it. We must, therefore, look to the moist earth for the large supply of water necessary for the development of these voluminous masses of ice. But by what force, and through what agency is it elevated and protruded? Impressed with the idea that the phenomenon is purely *physical*—

having no connection with the vitality of the stem; it seemed reasonable, that the remarkable exudation of icy columns from certain kinds of earth, which long attracted my attention, might be referred to a similar cause. Considerations of this character induced me to study the latter phenomenon more carefully. During the winters of 1848-49, and 1849-50, abundant opportunities occurred of examining the phenomenon, under the most diversified circumstances; the soil in this neighborhood* being peculiarly adapted to its development. The following facts seem to be established by my observations:

1. The phenomenon occurs most strikingly when a warm rainy period terminates in clear freezing weather, with the wind from the West or North-West. It is more or less distinctly developed at all temperatures below 30° Fahrenheit. When, however, the thermometer was as high as this at sunrise, it was exhibited only in situations most favorable to radiation. It frequently appears during several consecutive

* Athens, Ga.

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nights after a rain, but usually, when the temperature remains nearly constant—with decreasing consciousness. This obviously arises from the diminution of moisture: in situations which are persistently wet, it is always developed in proportion to the depression of temperature.

2. It takes place in soils that are rather firm, but not very compact. For example: the phenomenon is beautifully exhibited along the sides of the water worn ravines, which furrow the declivities of the firm red clay-hills, of this primitive region, as well as along the cuts or ditches by the road-side. This clay seems to be formed by the decomposition, *in situ*, of hornblende gneiss and mica-schist. This soil presents the same phenomenon when thrown up and lying on the surface, provided it is not trodden down and rendered too compact. For this reason it never appears on the well-beaten highways, although it is seen abundantly along their margins. The influence of compactness of soil, is strikingly illustrated by the fact, that the protrusion of the icy columns will frequently occur around the margins and along the middle cleft of a track of a cloven-footed animal, while none were found on the portions where the clay had undergone compression. The clods found at the bottom of the ravines and along the margins of the brooks, generally afford beautiful manifestations of the phenomenon, under proper circumstances. It is seldom, if ever, observed in rich mellow alluvial soils abounding in vegetable matter.

After considerable reflection, we venture to offer the following as the most probable explanation of the phenomenon. Let us suppose a portion of tolerably compact porous and warm earth saturated

with moisture, to be exposed to the influence of a cold-producing cause. The soil being an indifferent conductor of heat, only a very superficial stratum would be reduced to the freezing point. As the resistance to lateral expansion is less at the surface, than it is at a sensible depth below, the effect of the first freezing would be to render the apices of the capillary tubes or pores conical or pyramidal.

The sudden congelation of the water, filling the conical capillaries in the superior stratum, would produce a rapid and forcible expansion, which being resisted by the unyielding walls of the cone, would not only protrude, but *project or detach and throw out* the thread-like columns of ice, in the direction of *least resistance*, or perpendicular to the surface. This would leave the summits of the tubes *partially empty*—a condition essential to the development of capillary force. Under these circumstances capillary attraction would draw up warm water from beneath, which, undergoing congelation, would, in like manner, elevate the column of ice still higher; and thus the process would go on as long as the cold continued to operate on unobstructed capillaries, supplied with sufficient water from below. It will be remarked, that this explanation makes the whole process of protrusion to take place in a stratum of earth, of almost inappreciable thickness. It also presumes, that the protruding force act *paroxysmally*. Does not the *wavy striated structure* of the icy columns clearly indicate that the freezing process is *intermittent*? It is obvious, that the *unfrozen state* of the soil is maintained through the operation of two causes, to wit.: the unceasing supply of warm water from below, and the large amount of *latent heat* evolved during the continued process of congelation. These two causes appear to be fully adequate to explain this remarkable fact. The foregoing view explains why the phenomenon does not take place on hard-beaten earth, and on very loose soils: **33**

We conclude these observations with a few remarks on the teleological bearing of the phenomenon which we have been considering. The laws of the effect of temperature on water, are so remarkable in their adaptation to the beneficial course of things, at the earth's surface, that they have never failed to impress the student of nature with the most profound admiration of the wisdom and goodness of

the Great Designer.

THE ANNUAL

OF

SCIENTIFIC DISCOVERY:

OR,

YEAR-BOOK OF FACTS IN SCIENCE AND ART.

EXHIBITING THE

MOST IMPORTANT DISCOVERIES AND IMPROVEMENTS IN

MECHANICS, ASTRONOMY, MINERALOGY,
USEFUL ARTS, METEOROLOGY, GEOLOGY,
NATURAL PHILOSOPHY, ZOOLOGY, GEOGRAPHY,
CHEMISTRY, BOTANY, ANTIQUITIES,

TOGETHER WITH A LIST OF RECENT SCIENTIFIC PUBLICATIONS;
A CLASSIFIED LIST OF PATENTS; OBITUARIES OF EMINENT
SCIENTIFIC MEN; AN INDEX OF IMPORTANT PAPERS
IN SCIENTIFIC JOURNALS, REPORTS, ETC.

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BOSTON:

GOULD AND LINCOLN,

59 WASHINGTON STREET.

1851.

[Volume II]

THE EXUDATION OF ICE FROM THE STEMS OF VEGETABLES,
AND THE PROTRUSION OF ICY COLUMNS FROM CERTAIN
KINDS OF EARTH.

At the meeting of the American Association at Charleston, an elaborate and important paper was read by Prof. John Le Conte "on a remarkable exudation of ice from the stems of vegetables, and on a singular protrusion of icy columns from certain kinds of earth during frosty weather." After referring to the little attention which phenomena of this nature have received, the author states that in a visit to the sea-coast of Georgia, in November, 1818, he had an opportunity of observing the remarkable deposition of ice around the stalks of certain plants, especially in the two species *Pluchea bifrons* and *P. camphorata*, both of which grow abundantly in wet soils, and along the road-side ditches of that section. The exudations are most abundant during the first clear frosty weather in November and December, when the earth is warm, and there is considerable difference between the temperature of the day and the night. When the temperature sinks towards daylight to about 23° or 30° F., or even lower, the surface of the ground is totally devoid of the slightest incrusting film of frozen earth, while hoar-frost is deposited in great profusion on all dead vegetable matter. At a distance, the accumulations of voluminous friable masses of semi-pellucid ice around the footstalks of the *Pluchea* present the appearance of locks of cotton-wool, varying from four to five inches in diameter.

The observations made by Prof. Le Conte appear to establish the following facts. 1. The depositions of ice are confined to the immediate neighbourhood of the roots of the plants, frequently commencing two or three inches from the ground, and extending from three to four inches along the axis of the stem. At this season the stalks are dead and dry to within about six inches of the earth, below which they are green and succulent, and the plant has a large porous pith, which is always saturated with moisture as high as six or seven inches from the base of the stem. 2. The ice emanates in a kind of ribbon or frill shaped, wavy, friable, semi-pellucid excrecence, "as if protruded in a soft state from the stem, from longitudinal fissures in its side," as described by Sir John Herschel, who noticed a similar phenomenon in the heliotrope. "The structure of the ribbons is fibrous, like that of the fibrous variety of gypsum, presenting a glossy silky surface,

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the direction of the fibres being at right angles to the stem, or horizontal." Their number varies from one to five, all issuing in vertical or longitudinal lines, which are not always symmetrically disposed around the axis. When the icy excrecences exceed five inches in length, which they frequently do, they are usually considerably curled. 3. "Although," as Herschel observes, "the icy sheets seem to have been protruded from the interior of the stem, yet on examination they were found to terminate sharply at its surface, and in no instance did they connect with any formation of ice within. The point of attachment was, however, always on the surface of the wood, beneath the outer bark, which the frozen sheets had in every instance stripped off, and forced out to a distance." The only thing observed by Prof. Le Conte, differing from this description, was, that in very severe frosts the icy sheets were often connected with the formation of ice within; but from various circumstances it is obvious that in these instances the frigorific action was too intense to permit the phenomenon to be developed in a normal manner. 4. The phenomenon took place in the same plant during several consecutive nights, and when the wood was not rifted frequently from the same portion of the stalk. When the wood was split, the deposition of ice occurred lower down on the stem, till finally the stalks became completely rifted from the height of six or seven inches to the ground, and this is the reason why the exudations are seldom observed after mid-winter. 5. Stems cut off within three or four inches of the ground exhibited the phenomenon the same as those untouched. The icy sheets never issued from the cut surface, but from longitudinal lines commencing below it and extending towards the root. Plants transplanted to a box of moist earth exhibited the phenomenon much less strikingly than those left *in situ*.

Prof. Le Conte is of the opinion, for various reasons, that we must look to the moist earth for the supply of water necessary for the formation of these masses of ice. But before proceeding to the consideration of the question by what force and through what agency it is elevated and protruded, he remarks that, "impressed with the idea that the phenomenon is purely physical, having no connection with the vitality of the stem, it seemed reasonable that the remarkable exudation of icy columns from certain kinds of earth might be referred to a similar cause." He considers that his observations upon this

weather, when the thermometer stood as low as 5°. Though the ground was not frozen, yet, on cautiously removing the icy columns, the moist clay was found to present a very porous appearance, as if perforated by a multitude of holes or spiracles, corresponding in position with the bundles of thread-like ice.

A careful examination of the two series of facts, with reference to the exudations of icy fringes from the stems of plants and the protrusion of columns of ice from certain soils, must convince every one that both of these phenomena should be referred to one and the same cause. If we admit this identity of cause, it must obviously be a purely physical one. The author then shows from various facts what cannot be this cause, confining himself more particularly to the phenomenon exhibited by the soil. It cannot be caused by the vapor in the general atmosphere. Nor can it be occasioned by the cold conducting a superficial stratum of earth, and thus forcing up the moisture which freezes at the surface.

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the surface. This would leave the summits of the tube partially empty, and warm water, being drawn up from beneath by capillary attraction, would freeze and elevate the column still higher. After mentioning the various appearances which this theory accounts for, the author applies it to the exudations on plants, the only difference being, that the porous pith furnishes the supply of warm water from the earth, while the wedge-shaped *medullary rays* secure the mechanical conditions necessary for the development of the projectile force in the proper direction. The paper is of considerable length, and abounds in interesting details not to be compressed into a short abstract.

phenomenon have established these facts among others:—1. It occurs most strikingly when a warm rainy period terminates in clear freezing weather, with the wind from the west or northwest. It is developed at all temperatures below 30° F.; and in situations which are persistently wet it is always in proportion to the depression of temperature. 2. It occurs in soils that are rather firm but not very compact, and is seldom if ever observed in rich, mellow, alluvial soils, abounding in vegetable matter. 3. The general appearance of the phenomenon is that of a vast number of filaments of ice, forming in their aggregation fibrous columns resembling bundles of spun glass, emanating at right angles to the surface as if protruded in a semi-fluid state from an infinitude of capillary tubes in the ground. The structure of the columns is fibrous, presenting a fine silky, wavy, silvery surface,

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and they are more or less transparent, depending apparently on the purity of the water and the state of aggregation of the icy filaments. Sometimes the fibres are readily separated; at others they are fused together. When examined by transmitted light, *trigasteræ striæ* are observed to cross the filaments at intervals of from one tenth to one thirtieth of an inch. The columns vary in length from one to four or even five inches, and in size from more threads to prismatic bundles of one fourth of an inch in diameter. 4. On examination the columns were found to terminate sharply at the surface of the earth, never being connected with any formation of ice below where the phenomenon was fully developed, and, in most cases, the soil from which they protruded was not frozen in the slightest degree, even in the severest

A

CLASSICAL DICTIONARY;

CONTAINING

A COPIOUS ACCOUNT OF

ALL THE PROPER NAMES

MENTIONED IN ANCIENT AUTHORS;

WITH

THE VALUE OF COINS, WEIGHTS, AND MEASURES,

USED AMONG THE GREEKS AND ROMANS;

AND

A CHRONOLOGICAL TABLE.

 BY J. LEMPRIERE, D. D.

SECOND AMERICAN FROM THE EIGHTH LONDON EDITION.

NEW-YORK:

PRINTED AND PUBLISHED FOR A. T. GOODRICH, AND WILLIAM B. GILLEY, NEW-YORK,
MATHew CAREY, AND EDWARD EARLE, PHILADELPHIA.

BY T. & W. MERCEIN.

1816.

THEOPHANIA, festivals celebrated at Delphi in honour of Apollo.

THEOPHILUS, a comic poet of Athens.

—A governor of Syria in the age of Julian.

—A friend of Piso.—A physician, whose treatise *de Urinis* is best edited by Guidotius, L. Bat. 1728, and another by Morell, 8vo. Paris, 1556.—One of the Greek fathers whose work *ad Autolyicum* is best edited in 12mo. by Wolf, Hamb. 1724.—The name of Theophilus is common among the primitive Christians.

THEOPHRASTUS, a native of Eresus, in Lesbos, son of a fuller. He studied under Plato, and afterwards under Aristotle, whose friendship he gained, and whose warmest commendations he deserved. His original name was *Tyrtamus*, but this the philosopher made him exchange for that of *Euphrastus*, to intimate his excellence in speaking, and afterwards for that of *Theophrastus*, which he deemed still more expressive of his eloquence, the brilliancy of his genius, and the elegance of his language. After the death of Socrates, when the malevolence of the Athenians drove all the philosopher's friends from the city, Theophrastus succeeded Aristotle in the Lyceum, and rendered himself so conspicuous, that in a short time the number of his auditors was increased to two thousand. Not only his countrymen courted his applause, but kings and princes were desirous of his friendship; and Cassander and Ptolemy, two of the most powerful of the successors of Alexander, regarded him with more than usual partiality. Theophrastus composed many books, and Diogenes has enumerated the titles of above 200 treatises, which he wrote with great elegance and copiousness. About 20 of these are extant, among which are his history of stones, his treatise on plants, on the winds, on the signs of fair weather, &c. and his Characters, an excellent moral treatise, which was begun in the 99th year of his age. He died loaded with years and infirmities, in the 107th year of

TH

his age, B. C. 288, lamenting the shortness of life, and complaining of the partiality of nature in granting longevity to the crow and to the stag, but not to man. To his care we are indebted for the works of Aristotle, which the dying philosopher intrusted to him. The best edition of Theophrastus is that of Heinsius, fol. L. Bat. 1613; and of his Characters, that of Needham, 8vo. Cantab. 1712, and that of Fischer, 8vo. Coburg. 1763. *Cic. Tusc.* 3, c. 28, in *Brut.* c. 31, in *Orat.* 19, &c.—*Strab.* 13.—*Diog. in vitâ.*—*Eliau. V. H.* 2, c. 8, l. 34, c. 20, l. 8, c. 12.—*Quintil.* 10, c. 1.—*Plut. adv. colot.*—An officer intrusted with the care of the citadel of Corinth by Antigonus. *Polyæn.*

THEOPOLEMUS, a man who, with his brother Hiero, plundered Apollo's temple at Delphi, and fled away for fear of being punished. *Cic. in Verr.* 5.

THEOPŌLIS, a name given to Antioch because the Christians first received their name there.

LECTURES ON BOTANY,

PRACTICAL, ELEMENTARY, AND PHYSIOLOGICAL,

WITH

A NEW AND FULL DESCRIPTION

OF

THE PLANTS OF THE UNITED STATES,
AND CULTIVATED EXOTICS, &c.

FOR THE USE OF

SEMINARIES, PRIVATE STUDENTS, AND PRACTICAL
BOTANISTS.

BY MRS. ALMIRA H. LINCOLN—NOW MRS. LINCOLN PHELPS.

PRINCIPAL OF THE PATAFSCO FEMALE INSTITUTE OF MARYLAND.
Author of *The Fireside Friend*, *A Series of works on Botany, Chemistry, and Natural Philosophy*, &c.

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NEW YORK.

PUBLISHED BY HUNTINGTON AND SAVAGE

216 PEARL STREET.

CINCINNATI:—H. W. DERBY & CO.
1849.

Many roots, as the rhubarb, wild-turnip, blood-root, &c. possess important medicinal properties. The growth of the root is most rapid in autumn; at this season, the sun being less powerful, and the air more charged with moisture, the juices condense in the lower part of the plant, and nourish it, but as the season becomes cold, vegetation is checked; the winter is the best time to collect roots for medicinal purposes, because their peculiar virtues are then most concentrated.

LECTURE VII.

OF THE STEM.

THE stem is the body of a plant, whether it be a tree like the oak, a shrub like the lilac, or an herb like the poppy; its use is to sustain the branches, leaves, and flowers, and to serve as an organ of communication between them and the root, conducting from the latter to the former, the animal and vegetable substances, salts, and earthy matter, which the radicles, by their mouths, suck up for the nourishment of the plant. The influence of light and air is, through the medium of the stem, conveyed from the leaves to the root.

* In the vicinity of Troy, I have seen a very beautiful species of the *Pterospora*, growing upon a branch of the whortleberry. Its colour was a bright crimson, which contrasted finely with the white flowers and green leaves of the plant on which it grew.

Parasitic plants—Air plants—Proper time to collect roots for medicinal purposes—Stem, its use.

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If a plant be watered by any coloured liquid, the stem will, in time, show that this fluid has ascended into it. There is also in the stem a set of vessels to carry downward the juices, which have passed through peculiar processes in the leaves of the plant.

But of the circulation of fluids in the vegetable substance we shall speak more particularly hereafter. Our present object is, to describe the external appearance of the vegetable organs, and not their internal structure; or, in other words, it is the *anatomy* and not the *physiology* of plants, which we are now attempting to explain.

The different kinds of stems have been divided into seven classes, as follows—

Caulis,* or proper stem, *Culm*, *Scapæ*, *Peduncle*, *Petiole*, *Frond*, and *Stipe*.

1st. *Caulis*, or proper stem, is such as is seen in forest trees, in shrubs, and in most annual plants. The *caulis* is either simple, as in the White lily; or branching, as in the Geranium. The branching is the more common form. You have here (Fig. 24) the representation of a *caulis*, or proper stem (*a*;) the representation of a *petiole*, or proper stem (*b*;) and a *petiole*, or leaf stalk (*c*.)

2d. *Culm*, or straw, (Fig. 25,) is the kind of stem which you see in grasses and rushes. The culm is either *without knots*, as in the Bulrush, *jointed* or *knotted*, as in Indian corn, *geniculated*, or bent like an elbow, as in some of the grasses. Those culms which are bent, are also knotted, though they may



Fig. 24.

be knotted without being bent. The Bamboo, Sugar Cane, and various species of Reeds, have stems of the culm kind; some of them, particularly the Bamboo, are known to attain the height of forty feet.

Fig. 26.



Fig. 26.

3d. *Scapæ*, (Fig. 26, a, a,) a stalk springing from the root, which bears the flower and fruit, but not the leaves; as the Dandelion, the Cowslip, and the Lily of the Valley. Plants with scapæ are sometimes called stemless plants; in this case, the scape would be considered as a peduncle proceeding from the root.

4th. *Peduncle*, or flower stalk, is but a subdivision of the caulis or stem; (See Fig. 24, b;) it bears the flower and fruit, but not the leaves; when the peduncle is divided, each subdivision is called a pedicel. In determining the species of plants, we often consider the length of the peduncle, compared with the flower; as, whether it is longer or shorter. When there is no peduncle or flower stalk, the flowers are said to be *sessile*.

* This kind of stem is by the French called *tige*; the *i* should be sounded like *é*, the *g* soft like *g*, as in *tige*. The word *Caulis* is from the Greek *Καυλος*, a stem.

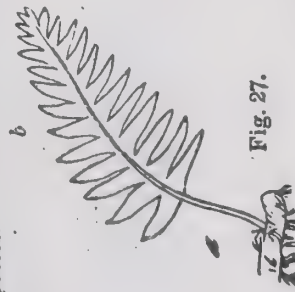
Division of stems—Caulis—Culm—Scape.

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5th. *Petiole*, or leaf stalk, is a kind of stem, like a fulcrum, supporting the leaf, as the *peduncle* supports the flower; it is usually green, and appears to be a part of the leaf itself. The petiole of many plants is somewhat in the form of a cylinder; but the upper surface is rather flattened, the under surface convex. You will find this remark useful, in distinguishing the foot-stalks of compound leaves from young branches, with which they are sometimes confounded. In most cases, the leaves and flowers are supported by distinct foot-stalks, but sometimes the foot-stalk supports both the leaf and flower. The petiole is often compared with the leaf, as the peduncle is with the flower, as to its relative length, in the different species.

6th. *Frond*, (Fig. 27.) The term frond, belongs entirely to Cryptogamous plants. This term however is applied to the leaf rather than the stem; in this sketch of the fern, the leafy part, *b*, is the frond; this bears the flower and fruit. Linnæus considered the leaves of palm-trees as fronds; we shall hereafter remark upon the different internal structure of their stems from those of the oak and other plants which are termed *cauline*, because their stem is a *caulis*. Plants with fronds are monocotyledonous.

Fig. 27.



7th. *Stipe*. The stem of the fern (Fig. 27, a,) is called a stipe. By observations of geologists it is ascertained that *stiped* plants were

created before *cauline* ones; petrifications of the former being found in the lower formations of the earth, while no remains of *cauline* plants are ever found there.

Fig. 28.



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LECTURE VIII.

OF BUDS.

Most leaves and flowers proceed from scaly coverings called buds. The scales envelop each other closely; the exterior ones being dry and hard, the interior moist, and covered with down; they are also furnished with a kind of resin or balsam, which prevents the embryo from being injured by too much moisture. (Buds have been known to lie for years in water, without injury to the germ within.)

The sap is the great fountain of vegetable life; by its agency new buds are yearly formed to replace the leaves and flowers destroyed by the severity of winter. Branches also originate from buds. Linnæus supposed that buds spring from the pith, this being found necessary to their formation and growth. The bud is a protuberance formed by the swelling of the germ; and as, for this purpose, the agency of an additional quantity of sap is needed, we see the bud appearing at the axils of leaves, or the extremities of branches and stems, where there is an accumulation of this fluid. If you plant a slip of Geranium, you will observe that it either sprouts from the axil of a leaf, or from knots in the stem, which answer the same purpose as the leaf, by slightly interrupting the circulation of the juices, and thus affording an accumulation of sap necessary for the production of a new shoot.

Some botanists distinguish the different periods of the bud as follows: first, the point in the plant which gives rise to the bud, is called the *eye*; when this begins to swell and become apparent, it is termed the *button*; and when it begins to unfold, the *bud*.

Herbs and shrubs have buds, but these usually grow and unfold themselves in the same season, and are destitute of scales; while the buds of trees are not perfected in less than two seasons, and, in some cases, they require years for their full development. You have, no doubt, observed in the spring, the rapid growth of the leaves and branches of trees; and perhaps, have also noticed, that as summer advances, the progress of vegetation seems almost suspended. But nature, instead of resting in her operations, is now busy in providing for the next year; she is turning the vital energies of the plants to

* These two kinds of stem have by some French botanists been called *exogenous* and *endogenous*; these words are derived from the Greek; the first signifying to grow externally, the second, to grow internally.

† These terms in French, are *l'œil*, the eye, *bouton*, the button, and *bourgeon*, the bud.

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the formation of buds. Those little embryo plants, so nicely wrapped up in downy scales as to be able to bear the coldness of winter, in the ensuing spring will come forth from their snug retreats, and taking

the places of the leaves which had withered in autumn, delight us with new verdure and beauty.

The term bud, in common language, extends to the rudiments of all plants, whether with scales or without, which originate upon other living plants. Buds with scales are chiefly confined to the trees of cold countries. In the northern part of the United States, there are few trees which can endure the cold weather, without this security. In Sweden, it is said, there is but one shrub destitute of buds, and this, from the peculiarity of its situation, is always protected from the inclemencies of weather.

* De Candolle, and others.

† A species of *Rhamnus*, which grows under trees, in marshy forests.

Period in which the formation of buds commences—Opinion of some botanists with respect to the scaly covering of buds—The term bud, how extensive in its application—Scaly buds chiefly confined to cold countries.

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It appears that no perennial plants, but those furnished with scaly buds, can live in climates where it snows a part of the year. Trees of the torrid zone, whose wood appears hard and firm, perish in our latitude. In warm climates, the buds of the trees are without scales, the tender shoots not requiring their protection.

That there is, in reality, a difference in the constitution of vegetables, as well as animals, is very apparent; an orange-tree will never form scales to protect its buds from cold, any more than the most delicate tropical animals can resist the rigours of a polar climate.

There are cases, however, in which both plants and animals change their habits. The horse-chestnut, in India its native climate, unfolds its leaves to the atmosphere without any check to their development; in a colder climate, the leaves in attempting to unfold, being checked in their progress, degenerate into scales, and form buds.

Figure 32 shows a branch of the Buttonwood-tree, (*Platanus*), in which the bud is formed within the petiole of the preceding year; this performs the office of the scaly covering in other buds. *a*, the lower part of the petiole cut vertically to show the cavity *b*, in which is contained the bud *c*.

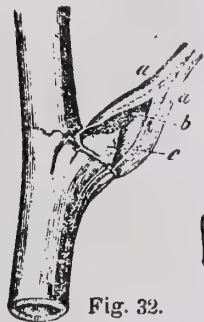


Fig. 32.

You are here (Fig. 33) shown a young branch of the Tulip-tree, (*Liriodendrum*): *a*, scales which covered the bud, now two stipules cauline and oval; *b*, part of the petiole of the leaf; *c*, another envelope of the bud, from which is detached the envelope *d*, in order to show the situation of the leaves *e* and the buds *f*. The buds *f*, are each furnished with a scaly envelope like those seen at *a*, *c*, and *d*.



Fig. 33

Monocotyledonous plants seldom produce more than one bud annually. On the summit of the palm appears the bud, containing the leaves and flowers; from the centre of this bud, a foot-stalk springs up bearing the flower, while the leaves spread out at its base. The following year the old leaves decay, forming by their indurated remains a ring around the stipe of the palm, and a new bud is formed upon its summit as before. This bud of the palm, from its form and size, is often called the cabbage.

Some botanists enumerate four kinds of buds, the *bulb*, *turion*, *bulbille*, and the *proper bud*. The two former we have considered under the head of roots, and the third under the stem.

Of the *proper bud*, there are three sorts:

1st. *The flower bud*, which is of a short round form, and contains the rudiments of one or several flowers, without leaves, folded over each and surrounded with scales.

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Leaves considered with regard to the manner in which they succeed each other in different stages of the plant.

1. *Seminal*, leaves which come up with the plant when it first appears above the surface of the earth; as in the garden bean; these leaves are only the cotyledons, or lobes of the seed, which, after nourishing the young plant, decay.

2. *Primordial*, leaves growing immediately after the seminal leaves, and resembling them in position, form, and size. The primordial leaf, according to the fanciful idea of a French botanist, is a sketch which nature makes before the perfection of her work.

3. *Characteristic*, leaves which are found in the mature state of the plant; or according to the idea above advanced, nature, in them, perfects her design.

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It is not always, however, that this process, with regard to change of leaves, takes place; as in many cases, the proper, or characteristic leaf, is the only one which appears.

Leaves, with respect to *Duration*, are,

Caducous, such as fall before the end of summer;
Deciduous, falling at the commencement of winter; this is the case with the leaves of most plants, as far as 30° or 40° from the equator;
Persistent, or permanent, remaining on the stem and branches, amidst the changes of temperature; as the leaves of the pine and

3d. *The mixed bud*, contains both leaves and flowers. We see at Fig. 34, a branch of the lilac, (*Syringa vulgaris*), bearing this kind of bud, opposite and covered with a scaly envelope. *B* is the same, cut vertically in order to show the thyrse of flowers formed in the buds in autumn.*

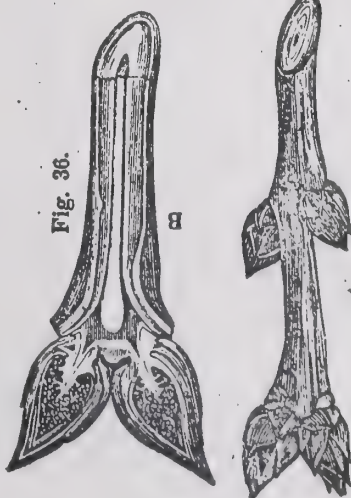


Fig. 36.

The leaf buds, if taken from the tree and planted in the earth, will grow and put forth roots; but the flower buds in the same situation will perish. You will perceive that a striking analogy exists between buds and seeds, as well as between buds and roots.

* I have this day, November 24, examined the buds of a vigorous lilac, and find, on cutting one vertically, the thyrse of flowers very apparent to the naked eye, and of nearly the size represented in the cut.

box;

Evergreen, preserving their greenness through the year; as the fir-tree and pine, and generally all cone-bearing and resinous trees; these change their leaves annually, but the young leaves appearing before the old ones decay, the plant is always green.

In our climate, the leaves are mostly deciduous, returning in autumn to their original dust, and enriching the soil from which they had derived their nourishment. In the regions of the torrid zone, the leaves are mostly persistent and evergreen; they seldom fade or decay in less than six years; but the same trees, removed to our climate, sometimes become annual plants, losing their foliage every year. The passion-flower is an evergreen in a more southern climate.

Leaves with respect to Colour.

Leaves have not that brilliancy of colour which is seen in the corolla or blossom; but the beauty of the corolla, like most other external beauty, has only a transient existence; while the less showy leaf remains fresh and verdant after the flower has withered away.

The substance of leaves is so constituted as to absorb all the rays of light except *green*; this colour is of all others best adapted to the extreme sensibility of our organs of sight. Thus, in evident accommodation to our sense of vision, the ordinary dress of nature is of the only colour upon which our eyes, for any length of time, can rest without pain.

But although green is almost the only colour which leaves reflect, the variety of its shades is almost innumerable.

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"No tree in all the grove but has its charms,
Though each its hue peculiar; paler some,
And of a wannish gray; the willow such,
And poplar, that with silver lines his leaf;
And ash far stretching his umbrageous arm;
Of deeper green the elm; and deeper still,
Lord of the woods, the long surviving oak."*

The contrast between their shades, in forests, where different families of trees are grouped together, has a fine effect, when observed at such a distance as to give a view of the whole as forming one mass.

A small quantity of iron, united to oxygen in the vegetable substance, and acted upon by rays of light, is said to give rise to the various colours of plants.† If this theory is correct, the different shades of colour in plants, must be owing to the different proportion in which the iron and oxygen are combined.

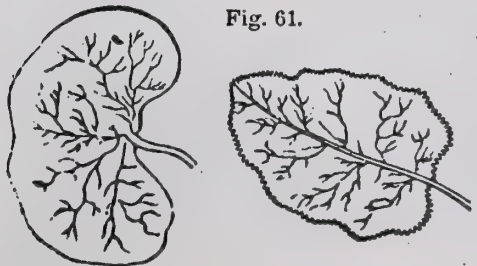
To quote the words of a celebrated chemist "When Nature takes her pencil, iron is the colouring she uses."

LECTURE X.

ANATOMY AND PHYSIOLOGY OF LEAVES—THEIR USE IN THE VEGETABLE SYSTEM—APPENDAGES TO PLANTS.

LEAVES are compared to the lungs of animals; they are organs for *respiring, perspiring, and absorbing*. When leaves are wanting, as in the Prickly Pear, (*Cactus*), the green surface of the stem appears to perform their office. If you will observe a dead leaf which has for some time been exposed to the action of the atmosphere, you may see its *skeleton*, or *frame-work*; this consists of various fibres, minutely subdivided, which originate from the petiole. This skeleton of the leaf may be examined to advantage, after boiling the leaves slightly, or rubbing them in water; the *cuticle*, or skin, easily separates, and the pulp, or cellular texture, may then be washed out from between the meshes of the veined net-work; thus, the most minute cords of the different vessels become perceptible, with their various divisions and subdivisions; these form what is called the *vascular system*. (See Fig. 61.)

Fig. 61.



Though in external appearance, the organs which compose the *vascular system* of plants, are analogous to the bones which constitute the foundation of the animal system, yet they are rather considered as performing the office of veins and arteries. They are found to be

dian pipe, is of pure white, resembling wax-work. Mushroom are also destitute of any green herbage. It is not known in what manner the deficiency of leaves is made up to these vegetables.

The period in which any species of plant unfolds its leaves, is termed *Frondescence*. Linnaeus paid much attention to this subject; he stated, as the result of his investigations, that the opening of the leaf-buds of the Birch-tree, was the most proper time for the sowing of barley. The Indians of our country had an opinion, that the best time for planting Indian corn was when the leaves of the White-Oak first made their appearance; or according to their expression, are of the size of a squirrel's ears.

One of the most remarkable phenomena of leaves, is their *irritability*, or power of contraction upon coming in contact with other substances. Compound leaves possess this property in the greatest degree; as the sensitive plant, (*Mimosa sensitiva*), and the American sensitive plant, (*Cassia nitida*;) these plants, when the hand is brought near them, seem agitated as if with fear; but as plants are destitute of intelligence, we must attribute this phenomenon to some physical cause; perhaps the warmth of the hand, which produces the contractions and dilatations of the leaves.

The effect of light upon leaves is very apparent, plants being almost uniformly found to present their upper surfaces to the side on which the greatest quantity of light is to be found. It has already

* Cowper
† This idea coincides with the supposition, that the green colour of leaves is changed to brown by the loss of an acid principle; that the petals of flowers change from purple to red by an increase of acid. The base of this acid is oxygen.

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Some of the uses of Leaves.

Leaves perform a very important office, in sheltering and protecting the flowers and fruit; the fact of their inhaling or absorbing air is thought to have been proved, by placing a plant under an exhausted receiver, permitting the leaves only to receive the influence of air; the plant remained thrifty in this situation for a length of time; but as soon as the whole plant was placed under the receiver, it withered and died.*

The upper surface of leaves is usually of a deeper green, and supposed to perform a more important part in respiration, than the under surface. The upper surface also repels moisture; you may perceive upon a cabbage-leaf after a shower, or heavy dew, that the moisture is collected in drops, but has no appearance of being absorbed by the leaf. (It has been found that the leaves of plants, laid with their surface upon water, wither almost as soon as if exposed to the air; although the leaves of the same plants, placed with their under surfaces upon water, retain their freshness for some days.) But few among the vegetable tribes are destitute either of leaves, or green stems, which answer as a substitute. The *Monotropa*, or In-

been observed, that plants throw off oxygen gas; but for this purpose they require the agency of light.

Carbonic acid gas is the food of plants; this consists of carbon and oxygen, and is decomposed by the agency of light; the carbon becomes incorporated with the vegetable, forming the basis of its substance, while the oxygen is exhaled, or thrown off into the atmosphere.

Many plants close their leaves at a certain period of the day, and

• I give this experiment on the authority of Barton; but although the respiration of leaves seems not to be doubted, this experiment may not be thought a fair one; for it would seem very difficult, to place a plant under a receiver, with the leaves exposed to the air, without, at the same time, admitting any air into the receiver.

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open them at another; almost every garden contains some plants in which this phenomenon may be observed; it is particularly remarkable in the sensitive plant, and the tamarind-tree. This folding up of the leaves at particular periods, has been termed the *sleep* of plants; a celebrated botanist,* remarks, "this may be as useful to the vegetable constitution, as real sleep to the animal." Linnaeus was led to observe the appearance of plants in the night, from a circumstance which occurred in raising the Lotus plant; he found one morning some very thrifty flowers, but on looking for them at night, they were no longer visible. This excited his attention, and he began to watch their unfolding. He was thus led to investigate the appearance of other plants at the same time, and to observe their different manner of sleeping. He found, as darkness approached, that some folded their leaves together, others threw them back upon their petioles, or closed their corollas, thus exhibiting a variety of interesting phenomena. This state of relaxation and repose seems to depend on the absence of light; with the first rays of the morning sun, the leaves recommence their chemical labours by drawing in oxygen, the fibres of the roots begin to imbibe sustenance from the earth, and the whole vegetable machinery is again set in motion. It is not solar light alone which seems capable of producing its effect on plants; this has been proved by the following experiment. A botanist placed the sensitive plant in a dark cave, and at midnight lighted it up with lamps; the leaves which were folded up, suddenly expanded; and when, at midday, the lights were extinguished, they again as suddenly closed.

Falling of the Leaf.

The period at which leaves fall is termed the *Defoliation* of the plant. The "fall of the leaf" may be referred to two causes; the *death* of the leaf, and the *vital action of the parts to which it is attached*. If a whole tree be killed by lightning, or any sudden cause, the leaves will adhere to the dead branches, because the latter have not the energy to cast them off. The development of buds, the hardening of the bark, and the formation of wood, accelerate the fall of the leaf. Heat, drought, frosts, wind, and storms, are all agents in their destruction.

About the middle of autumn, the leaves of the Sumac and Grape vine begin to look red, those of the Walnut, brown, those of the Honeysuckle, blue, and those of the Poplar, yellow; but all sooner or later take that uniform and sad hue, called the *dead-leaf* colour. The rich autumnal scenery of American forests is regarded by the European traveller with astonishment and delight, as far exceeding any thing of the kind which the old world presents. Painters, who have attempted to imitate the splendid hues of our forests, have, by foreigners, been accused of exaggeration; but no gorgeous colouring of art can exceed the bright scarlet, the deep crimson, the rich yellow, and the dark brown, which these scenes present.

LECTURE XII.

COROLLA.

THE term *Corolla*, or corol, is derived from the Latin, *corona*, a crown or chaplet. As the calyx is formed by a continuation of the fibres of the outer bark, the corolla is a continuation of the inner coat of the same. The texture of the corolla is delicate, soft, watery, and coloured. It exhales carbonic acid gas, but not oxygen, neither in the dark, nor when acted upon by light. The cuticle, or outward covering of the corolla, is of an extremely fine texture. The rich and variegated colours of flowers, are owing to the delicate organization of the corolla; and to this cause the transient duration of this organ may also be attributed.

The corolla exhibits every variety of colour except black; florists sometimes present us with what they term black roses, and we see

In the same species of plants the number of seeds is often found to vary. The apple, and many other fruits, might be given as examples.

Seeds, according as they vary in size, have been divided into four kinds; *large*, from the size of a walnut to that of the cocoa-nut; *middle* size, neither larger than a hazel nut, nor smaller than a millet seed; *small*, between the size of the seeds of a poppy and a bell-flower; *minute*, like dust or powder, as in the ferns and mosses.

When a pericarp separates itself from the parent plant, or when the valves of the fruit open, the fruit has ceased to vegetate; like the leaves at the end of autumn, it has lost its vital principle, and becomes subject to the laws which govern inorganic matter.

The maturity of the seed marks the close of the life of annual plants, and the suspension of vegetation in woody and perennial ones. Nature, in favouring by various means the dispersion of these seeds, presents phenomena worthy of our admiration, and these means are as varied as the species of seeds which are spread over the surface of the earth.

The air, winds, rivers, seas, and animals, transport seeds and disperse them in every direction. Those which are provided with feathery crowns, or egrets, as the dandelion and thistle, or with wings, as the maple and ash, are raised into the air and even carried across the seas. Linnaeus asserted that the *Eragrostis canadense* was introduced into Europe from America, by seeds wafted across the Atlantic Ocean. "The seeds," says he, "embark upon the rivers

some other flowers which approach this colour, yet none are perfectly black; the darkest being but a very deep shade of purple. Corollas are white, yellow, blue, violet, &c.; in some, different colours are delicately shaded, and blended; in others, they meet abruptly, without any intermediate tint. The colour of the corolla, in the same species, often varies without any assignable cause. This fact is strikingly illustrated in the *Four o'clock*, (*MIRABILIS*;) the flowers of which are sometimes of pale yellow, sometimes bright crimson, and often richly variegated. These varieties are the result of circumstances not under the control of man; and the florist watches these changes, and, as far as possible, avails himself of them in the production of new beauties in the vegetable kingdom.

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General Remarks upon Seeds.

The number of seeds in plants is variable; some have but one; some, like the umbelliferous plants, have two; some have four. The number varies from these to thousands. A stalk of Indian corn is said to have produced, in one season, two thousand seeds. A sunflower four thousand. A capsule of the poppy has been found to contain eight thousand seeds. It has been calculated that a single thistle seed will produce, at the first crop, twenty-four thousand, and at the second crop, at this rate, five hundred and seventy-six millions.

which descend from the highest mountains of Lapland, and arrive at the middle of the plains, and the coasts of the seas. The ocean has thrown, even upon the coasts of Norway, the nuts of the mahogany, and the fruit of the cocoanut-tree, borne on its waves from the far distant, tropical regions; and this wonderful voyage has been performed without injury to the vital energy of the seeds."

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The question naturally arises, by what force is the sap made to ascend, contrary to the laws of gravitation? Some have asserted, that this phenomenon was owing to the *contraction* and *dilatation* of the air, and of the juices of the plant; others have referred it to the action of *heat*; these two propositions, however, amount to the same thing, since *heat* is the cause of the contraction and dilatation referred to. Some ascribe the ascent of the sap to the *irritability* of the vessels, and the *energy* of *vital power*.

The latter is but a vague and unsatisfactory explanation, since we know neither the cause of this irritability, nor in what this vital power consists. There is no doubt but the ascent of the sap is, in a degree, owing to capillary attraction, assisted by heat. You will recollect that the vessels containing this fluid, were described as very small tubes, no larger than a hair, and, in most cases, much smaller, since few are visible to the naked eye. Those who understand something of Natural Philosophy, know that capillary tubes have the property

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of raising liquids against the laws of gravitation, and with a force proportional to their smallness of diameter;—this law seems to explain, in some degree, the phenomenon we are considering.

But it is necessary for us now to trace the progress of the sap, after it has ascended to the leaves and extremities of the plant. A considerable portion of it is, by pores in the leaf, exhaled in the form of almost pure water, while the particles of various kinds, which the sap held in solution, are deposited within the substance of the leaf. This process is sometimes termed the *perspiration* of plants; it is visible in some grass-like plants, particularly upon the leaves of Indian corn. If these are examined before sunrise, the perspiration appears in the form of a drop at the extremity of the leaf; the ribs of the leaf unite at this point, and a minute aperture furnished for the passage of the fluid, may be discovered.

The sap which remains, after the exhalation by means of the leaves, is supposed to consist of about one third of that originally absorbed by the root; this remainder possesses all the nutritive particles which had, before, been divided through the whole of the sap. At this period, an important change in its nature takes place, and one which has its analogy in the animal economy.

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The plants of the class Syngenesia are, in general, easily recognised at the first glance; there is something about them besides their

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compound character which distinguishes them from all other plants.

One botanist observes, that they have a kind of "weed-like appearance, notwithstanding the beauty of their colouring; the stems and leaves are often rough, and they seem to have been less completely reclaimed from their savage state, than most other plants, with the exception of the Cryptogamous class."

Few plants of this class are poisonous; for though milky plants are generally so, those of this class are exceptions. The lettuce however contains a narcotic principle, and opium may be made from it. The dandelion, the thorough-wort, the chamomile, and wormwood, with many other plants of this class, are valued for medicinal properties.

The Syngenesious plants are particularly abundant in our own country, and you will never find difficulty in procuring specimens. If you commence botanical studies with the flowers of spring, nature gradually presents you with those that are more difficult to investigate. This class, it has been before remarked, are chiefly in blossom in the latter part of the season. Being previously prepared by a knowledge of the general principles of classification, and observations of plants, you will no doubt derive pleasure from the study of the class Syngenesia; though were you to commence a course of botany with these plants, you would feel as if thrown amidst a chaos of facts, without any clew to their classification.

Orchis tribe of Plants.

The natural order, Orchideæ, is composed of genera which belong to the class Gynandria; the principal of these is the *Orchis* genus, the different species of which are mostly perennial, and grow in moist and shady places; some are parasites, adhering to the bark of trees by their fleshy, fibrous roots. The roots sometimes consist of two solid bulbs, in other cases, they are oblong, fleshy sub-stances, tapering towards the ends like the fingers of the hand. The name *Orchis* is derived from a Greek word, signifying an olive-berry, on account of the root being round, like that fruit. The distinguishing characters of this tribe, are a corolla, above the germen, 5 petals, 3 external and 2 internal. There is also in each corolla, a petal-like organ called the lip, which varies in form and direction; anthers always 1 or 2, and from 1 to 4-celled, sessile, or sitting upon the side or apex of the style; the pollen is easily removed from the cells in glutinous masses; the styles are simple, with viscous stigmas of various forms and positions. The capsules are 1-celled, 3-valved, 3-keeled; the seeds are numerous and dust-like, the leaves clasp the stem like the leaves of grasses. The stems or scapes are simple, and the flowers are arranged in spikes or racemes.

From the first appearance of vegetation in the spring, until the

commencement of winter, nature presents an ever varying scene. The phenomenon of the *flowering* of plants, as, in many respects similar to that of the *putting forth of leaves*; in both, the same causes either hasten or retard this period. The putting forth of leaves, and the blossoming of flowers, differ, however, in one circumstance; the leaves begin by the upper leaf-buds; the flowers by the lower flower-buds; *stipes*, *puncles*, and *thyrses*, begin to blossom gradually from the base to the summit, *cymes* and *umbels* blossom from the outside to the centre.

• This is called *flor-escencia*.

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In May, many species of the *Viola* appear; there is sometimes a difficulty in determining between these species; the distinctive marks seem often to be blended; we are in such cases obliged to place our plant under that species to which it seems to have most resemblance.

One of the most interesting flowers of this season, found in woods and meadows, is the *ANEMONE Virginiana*, the Wind-flower, a name given, as some say, because the flower expands only in windy weather; its petals are large and usually white, the stem grows to the height of two or three feet, and contains one terminal flower. Several other species of the *Anemone* are in blossom about this time.

Flowers of Summer.

The plants which are now in blossom are very numerous; we will mention a few of the most common and interesting.

A well-known shrub, the elder, (*Sambucus*), is now found along the sides of hedges, or on the margin of brooks, and in the meadows; the *Rubus*, or raspberry, the *Ranunculus*, or butter-cup, the *Cynoglossum*, or hound's-tongue, and the *Trifolium*, or clover. It is recorded in history that when St. Patrick went as a missionary to preach the Gospel to the pagan Irish, "he illustrated the doctrine of the Trinity, by showing them a trifolium or three-leaved grass with one stalk; this operating to their conviction, the Shamrock, which is a bundle of this grass, was ever afterward worn upon this Saint's anniversary, to commemorate this event."

In the meadows is seen at this time the *Geranium maculatum*, a showy flower, and almost the only American *Geranium*; in the woods, the splendid ladies'-slipper, (*Cypripedium*), and the wild mandrake, (*Podophyllum*), a flower of curious appearance.

The genus *Convallaria*, of which the Solomon's seal is an example, may now be found; it is usually white, of a funnel-form corolla. Some other species, as the lily-of-the-valley, have a bell-form corolla. The various species of *Vaccinium*, of which the whortleberry is an example, are now in blossom; the woods are ornamented by the snowy white *Cornus*, or dog-wood flowers.

In the early part of June the foliage of the trees usually appears in perfection; among the earliest are the willow, poplar, and alder; next are the bass-wood, horse-chestnut, oak, beech, ash, walnut, and mulberry, which are not all usually in full leaf before the middle of June.

At the summer solstice a new race of blossoms appears; as the roses, pinks, and lilies, with many other exotics. The Iris is found in stagnant waters and in gardens. Among native plants we now find the *Asclepias*, or milk-weed, of which there are some very showy, and some delicate species. The little bell-flower (*Campanula*) may be seen nodding over the brows of the rocks.

The brilliant laurel (*Kalmia*) is now in bloom. The climbing virgin's-bower (*Clematis*) hangs in graceful clusters of white flowers from the boughs of shrubs and trees growing by the side of brooks. The curious side-saddle flower, (*Sarracenia*), which was described under the class Polyandria, is now to be found in swamps and wet grounds. The mullein, with its long yellow spike, is very conspicuous in old fields and by the road-side.

More flowers are in blossom about the time of the summer solstice than during any period of the year, until the blossoming of the autumnal plants. The hot breath of summer seems to wither the expanding flowers, the earlier ones fade away, and the late ones do

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not immediately come forward;—it would seem as if the earth, having poured forth in rapid succession innumerable treasures, now required a suspension of her efforts; but with recovered energy, she soon begins to spread forth new beauties, and to deck herself in her most gorgeous attire.

LECTURE XXXIX.

AUTUMNAL FLOWERS—EVERGREENS—ANCIENT SUPERSTITION RESPECTING PLANTS—VARIOUS PHENOMENA OF PLANTS.

The autumnal flowers differ in appearance from those which we find in the earliest part of the season. Few examples of the compound flowers occur until the latter part of July, and beginning of August;—this is fortunate for students just commencing the analysis of plants; were they to find only the compound flowers at first, they would be discouraged; but nature seems kindly to lead them on step by step, reserving the more difficult plants until they have had an opportunity of becoming familiar with the easier classes.

There is little difficulty in learning to distinguish the different families of compound flowers; as an *Aster* from a *Solidago* or a *Helianthus*. But some of these families contain many species; and the chief difficulty consists, not in finding the genus, but in determining the species. Indeed it is not to be concealed, that there is, in this part of botanical science, some confusion among writers; and the student need not be discouraged if he is not always able to find his plant exactly to coincide with any other species described.

Among the fine flowers which autumn presents, are the scarlet *Lobelia*, or cardinal flower; the yellow *Gerardia*, (false fox-glove),

the state of the atmosphere; accurate observers of nature have made remarks upon these changes, as prognosticating certain changes of weather. Lord Bacon, who was remarkably attentive to all the appearing and changes of natural objects, is the author of the following observations.

"*Chickweed*, (*Anagallis*.) When the flower expands boldly and fully, no rain will happen for four hours or upwards: if it continues in that open state, no rain will disturb the summer's day; when it half conceals its miniature flower, the day is generally showery; but if it entirely shuts up or veils the white flower with its green mantle, let the traveller put on his great-coat, and the ploughman, with his beast of draught, expect rest from their labour."

"*Siberian Southwistle*, (*Sonchus*.) If the flowers of this plant keep open all night, rain will certainly fall the next day.

"*Trefoil*, (*Hedysarum*.) The different species of trefoil always contract their leaves at the approach of a storm; hence these plants have been termed the husbandman's Barometer.

"*African Mary-gold*. If this plant opens not its flowers in the morning about seven o'clock, you may be sure it will rain that day, unless it thunders.

"*White thorns* and *dog-rose bushes*. Wet summers are generally

Holy Rood day.—Ignorance of the monks and nuns.—Various phenomena of plants.—Lord Bacon's observations.—Changes of flowers indicating changes of weather

and the noble sun-flower, (*Helianthus*.) The *Linnaea borealis* is found in September; at this time the white pond-lily, (*Nymphaea*), one of the most splendid of American flowers, is seen whitening the surface of the lakes and ponds, sometimes alternating with the yellow water-lily, (*Nuphar*), a flower of less striking elegance than the former, but perhaps not less curious in its form.

Another aquatic plant, which, although it blossoms in summer, continues in flower until late in the autumn, is the *Sagittaria*, or arrow-head, with a calyx of 3 sepals, and three white petals. The *Eupatorium*, or thorough-wort, which blossoms in autumn, has no external beauty to recommend it, but as a remedy in diseases, perhaps no plant is more useful.

Among the exotics which grace the decline of the year, are the splendid *dahlia*s; the gay *chrysanthemums* blossom only on the verge of winter, but they require protection from frosts. We see among the last blossoms of the season, the aster, and some other compound flowers; these seem for a time to endure the autumnal blasts, but they gradually give way to the reign of winter; while the desolate fields and meadows present but a gloomy contrast to their former verdant and glowing appearance.

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Phenomena of Plants, arising from changes in the atmosphere.

Plants exhibit some phenomena which are supposed to arise from

attended with an uncommon quantity of seed on these shrubs, whence their unusual fruitfulness is a sign of severe winter."

Besides the above, there are several plants, especially those with compound yellow flowers, which during the whole day turn their flowers towards the sun, viz. to the East in the morning, to the South at noon, and to the West towards evening. This is very observable in the sowthistle, *Sonchus arvensis*; and it is a well known fact, that a great part of the plants in a serene sky expand their flowers and as it were with cheerful looks behold the light of the sun; but before rain they shut them up, as the tulip.

The flowers of the chick-wintergreen (*Trientalis*) droop in the night, lest rain or moisture should injure the fertilizing pollen.

One species of *woodsorrel* shuts up or doubles its leaves before storms and tempests, but in a serene sky expands or unfolds them, so that husbandmen can foretell tempests from it. It is also well known that the sensitive plants, and *cassia*, observe the same rule.

Besides affording prognostics of weather, many plants fold themselves up at particular hours, with such regularity as to have acquired names from this property. The following are among the more remarkable plants of this description.

Goatsbeard. The flowers of both species of *Tragopogon* open in the morning at the approach of the sun, and, without regard to the state of the weather, regularly shut about noon. Hence it is generally known by the name of *go-to-bed-at-noon*.

The *four o'clock*, (*Mirabilis*), sometimes called Princess' leaf, is an elegant shrub in its native clime, the Malay islands. It opens its flowers at four in the evening, and does not close them till the same hour in the morning. It is said people transplant them from the woods into their gardens, and use them as a dial or clock, especially in cloudy weather.

The *Evening Primrose* (*Oenothera*) is well known from its remarkable property of regularity, shutting with a loud popping noise about sunrise, and opening at sunset. After six o'clock, these flowers regularly report the approach of night.

The *Tamarind-tree*, the water-lily, (*Nymphaea*), the mary-gold, the false sensitive-plant, and several others of the Diadelphia class, in serene weather expand their leaves in the daytime, and contract them during the night. According to some botanists, the tamarind-tree infolds within its leaves the flowers or fruit every night, in order to guard them from the cold or rain.

The flower of the garden lettuce opens at seven o'clock, and shuts at ten.

"A species of serpentine aloes, whose large and beautiful flower exhales a strong odour of the Vanilla during the time of its expansion, which is very short, is cultivated in the imperial garden of Paris. It does not blossom until towards the month of July, and about five o'clock in the evening, at which time it gradually opens its petals, expands them, droops and dies. By ten o'clock the same night it is totally withered, to the great astonishment of the spectators, who flock in crowds to see it.

"The *cereus*, a native of Jamaica and Vera Cruz, exhibits an exquisitely beautiful flower, and emits a highly fragrant odour for a few hours in the night, and then closes to expand no more. The flower is nearly a foot in diameter, the inside of the calyx of a splendid yellow, and the numerous petals are of a pure white.

Plants which turn towards the sun—Plants which hang their heads at night and in storms—The *go-to-bed-at-noon*—The *four o'clock*—*Evening primrose*—*Tamarind-tree* &c.—*Aloes*—*Night-blooming cereus*, &c.

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"The flower of the dandelion possesses very peculiar means of sheltering itself from the heat of the sun, as it closes entirely whenever the heat becomes excessive."

Linnaeus enumerated forty-six flowers which possess this kind of sensibility; he divided them into three classes.

1. *Meteoric flowers*, which less accurately observe the hour of folding, but are expanded sooner or later, according to the cloudiness, moisture, or pressure of the atmosphere.

2. *Tropical flowers*, that open in the morning, and close before evening every day, but the hour of their expanding becomes earlier or later, as the length of the day increases or decreases.

3. *Equinoctial flowers*, which open at a certain and exact hour of the day, and for the most part close at another determinate hour.

Among the earliest botanists of North America, were Colder, Michaux, and Muhlenberg; Pursh was the first who finished a system of North American plants, so arranged as to be useful to the student. Some of the first teachers of the science were Barton, Hoack, and Mitchell. The first public lecturer on Botany, was Professor Amos Eaton. Dr. Bigelow gave a course of lectures in Boston, in the year 1813, and soon after published his *Boston Flora*. Professor Ives and Dr. Tully did much in New England towards awakening a zeal for the science, in the years 1815 and 1816; and at a later period, Dr. Sumner has pursued and illustrated the study with much ardour and success.

Want of books was a great impediment to the progress of the science when Eaton published his *Manual of Botany*; this book gave a new impulse to the progress of the science; its familiar method and simple style induced many to commence the study. This was followed by many other works describing plants, and several elementary works; of the former class were Nuttall's *Genera*, Elliott's *Southern Plants*, Barton's *Flora of Philadelphia*, Darlington's *Torrey's*, and Bigelow's *Flora*; these furnished descriptions of most American plants, not included in the works of Pursh. Among elementary books are "Parton's Elements," a large work containing much that is interesting in the physiology of plants; "Lock's Botany," a small book, but exhibiting a plan of arrangement simple and methodical; "Sumner's Compendium of Botany," written in a beautiful and pure style; and more recently, "Nuttall's Elementary Work," which gives in popular language more facts with regard to plants, than almost any other work of the kind; a small work entitled "Catechism of Botany," by Miss Jane Welsh, was the first attempt by an American lady to illustrate the science. Professor Lindley's late work, entitled "Introduction to the Natural System of Botany," though it may be highly useful to the advanced student, cannot be studied with advantage except by the practical botanist. Beck's *Botany* is a neat and beautiful introduction to the natural system, and his descriptions of Genera and Species are valuable.

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To go back to the infancy of Botany in the United States, we find the name of Bartram stands recorded in history, as that of the first native of our country who was conspicuous for botanical researches. Houston investigated the region of Canada, and described many of its plants; in honour of him is named the little flower *Houstonia cœrulea*, which is abundant in New England. Clayton made a list of Virginian plants, and is commemorated in the beautiful *CLAYTONIA virginica*. Kalm, a pupil of Linnaeus, whose name is given to the *KALMA*, (American laurel,) spent three years in America, and returned to Europe laden with botanical treasures; the sight of the American plants brought by his pupil, many of which were entirely new to him, is said to have produced such an effect upon Linnaeus, that although lying ill of the gout, and unable to move, his spirits were rekindled, and in the delight of his mind he forgot his bodily anguish, and recovered from his disease.

Although American works on Botany are not wanting, the author of these Lectures found no one book, either foreign or American, which seemed designed to conduct the pupil through a full and connected course of study. To bring together in one volume the Elements of Vegetable Anatomy and Physiology, the principles on which the Natural and Artificial Classification depend, and to teach these systems by a full exposition of them, and by a Flora of Plants, for practice in analytical Botany—these have been the objects in view in the preparation of this work.

NATURAL SYSTEM OF BOTANY;

OR,

A SYSTEMATIC VIEW

OF

THE ORGANISATION, NATURAL AFFINITIES, AND GEOGRAPHICAL DISTRIBUTION,

OF THE WHOLE

VEGETABLE KINGDOM;

TOGETHER WITH THE USES OF THE MOST IMPORTANT SPECIES IN MEDICINE,
THE ARTS, AND RURAL OR DOMESTIC ECONOMY.

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PROFESSOR OF BOTANY IN THE UNIVERSITY OF LONDON,
IN THE ROYAL INSTITUTION OF GREAT BRITAIN, AND TO THE
SOCIETY OF APOTHECARIES.

"C'est ainsi que sont formées les familles très naturelles et généralement avouées. On extrait de tous les genres qui composent chacune d'elles les caractères communs à tous, sans excepter ceux qui n'appartiennent pas à la fructification, et la réunion de ces caractères communs constitue celui de la famille. Plus les ressemblances sont nombreuses, plus les familles sont naturelles, et par suite le caractère général est plus chargé. En procédant ainsi, on parvient plus sûrement au but principal de la science, qui est, non de nommer une plante, mais de connaître sa nature et son organisation entière."
— LUSKIU.

SECOND EDITION,

WITH NUMEROUS ADDITIONS AND CORRECTIONS, AND A COMPLETE
LIST OF GENERA, WITH THEIR SYNONYMS.

LONDON:

LONGMAN, REES, ORME, BROWN, GREEN, AND LONGMAN,

PATERNOSTER ROW.

M.DCCC.XXXVI.

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UMBELLIFERÆ

PROPERTIES. The properties of this order require to be considered under two points of view: firstly, those of the vegetation; and, secondly, those of the fructification. The character of the former is, generally speaking, suspicious, and often poisonous in a high degree; as in the case of Hemlock, Fool's Parsley, and others, which are deadly poisons. Nevertheless, the stems of the Celery, the leaves of Parsley and Samphire, the roots of the Skirret, the Carrot, the Parsnep, the Arracacha, and the tubers of *Enanthe pimpinelloides* and *Bunium bulbocastanum*, are wholesome articles of food. The leaves of *Prangos pabularis*, afford a nourishing and abundant fodder for cattle; it is thought to have been the Silphium of the ancients. The fruit, vulgarly called the seed, is in no case dangerous, and is usually a warm and agreeable aromatic, as Caraway, Coriander, Dill, Anise, &c. From the stem, when wounded,

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sometimes flows a stimulant, tonic, aromatic, gum-resinous concretion, of much use in medicine; as Opoponax, which is procured from *Pastinaca opoponax* in

the Levant; Assafoetida from the *Ferula* of that name in Persia, and Sagapenum from some other species of *Ferula*. Gum ammoniac is supposed to be obtained from *Dorema ammoniacum*. It is a gum resin of a pale yellow colour, having a faint but not unpleasant odour, with a bitter nauseous taste. Internally applied, it is a valuable deobstruent and expectorant. It is said by Paris to be, in combination with rhubarb, a useful medicine in mesenteric affections, by correcting viscid secretions. *Ainslie*, l. 160. The substance called Galbanum is produced by some plant of this order, which Don calls Galbanum officinale. It is a stimulant of the intestinal canal and uterus, and is found to allay that nervous irritability which often accompanies hysteria. *Ainslie*, l. 143. *Cicuta virosa* has its roots gorged with a gum-resinous juice, which is a violent poison for man and animals. *Enanthe crocata*, and *Phellandrium*, and *Cethusa Cynapium* have leaves and stems with a similar character; the latter has been found by Ficus, of Dresden, to contain a peculiar alkali, which he calls Cynopia. *Turner*, 654. The fruit of *Ligusticum ajacium* of Roxb. is prescribed in India in diseases of horses and cows. *Ainslie*, l. 38. The roots of *Eryngium campestre* are slightly aromatic.

With regard to *Conium maculatum*, which is also a most dangerous poison, it is remarkable how its properties are affected by climate; in Russia and

the Crimea it is inert and eatable; in the south of Europe it is extremely dangerous. *Fée*, who makes this statement, adds, that for medicinal purposes it should be collected in June, shortly after flowering, and asserts that if gathered later its energy is much impaired. The same author doubts whether our Columium was really the plant from which the death-drinks of the Greeks were prepared. See some excellent general remarks upon the properties of this order in *Fée's Cours d'Histoire Naturelle Pharmaceutique*, 2. 172.

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ORDER. XIII. GROSSULACEÆ. THE CURRANT TRIBE.

GEOGRAPHY. Natives of the mountains, hills, woods, and thickets, of the temperate parts of Europe, Asia, and America, but unknown in Africa, the tropics of either hemisphere, or the South Sea Islands. In North America they are particularly abundant, and on the mountains of Northern India they contribute to give a European character to that remarkable region.

PROPERTIES. The properties of the Gooseberry and Currant are those of the generality of the order, except that in other species a mawkish or extremely acid taste is substituted for the refreshing and agreeable flavour of the former. Some are emetic; one is said to be intoxicating (*R. Inebrians*).

The obscure character of the radicle of the embryo of Onagraceæ being unusually long, has been relied on by some as a characteristic mark of the order. I formerly considered Hydrocaryes, Circeæ, and Haloragæ, as so many distinct orders; but upon a careful review of all the bearings of the question, I incline to believe that these little assemblages of genera, are mere forms or degenerations of Onagraceæ.

GEOGRAPHY. Chiefly natives of the temperate parts of the world, and especially of America: a good many are found in India, and a large number in Europe. In Africa they are scarcer, being mostly confined to the Cape, and to a few Jussiaeas inhabiting other parts of that continent.

PROPERTIES. Few, or unknown. *Oenothera biennis* is cultivated for the sake of its eatable roots; and the leaves of *Jussiaea peruviana* form an emollient poultice. *DC.*

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ORDER XXXII. CORNACEÆ. THE DOGWOOD TRIBE.

CAPRIFOLIACEÆ & CORNÆ, Kunth. Nov. G. Amer. 3. 430.—CORNÆ, DC. Prod. 4. 271. (1830); Martius Conspectus, No. 217. (1835).

ESSENTIAL CHARACTER.—*Sepals* 4, superior. *Petals* 4, oblong, broad at the base, inserted into the top of the calyx, regular, valvate in æstivation. *Stamens* 4, inserted along with the petals and alternate with them; *anthers* ovate-oblong, 2-celled. *Style* filiform; *stigma* simple. *Drupe* berried, crowned by the remains of a calyx, with a 2-celled nucleus. *Seeds* pendulous, solitary. *Albumen* fleshy; *radicle* superior, shorter than the 2 oblong cotyledons.—*Trees or shrubs*, seldom *herbs*. *Leaves* (except in one species) opposite, entire or toothed, with pinnate veins. *Flowers* capitate, umbellate, or corymbose, naked or with an involucre, occasionally by abortion diœcious. *Flesh* of the fruit eatable. *DC. Prod. 4. 271.*

AFFINITIES. These plants were formerly confounded with Caprifoliaceæ; they are however beyond all doubt the representatives of an entirely distinct order, as their habit and general characters ought long since to have foretold. From Caprifoliaceæ their polypetalous structure at once removes them. To Hamamelaceæ they approach very nearly, but they differ in the valvate æstivation of their corolla, &c. &c. In many respects Cornaceæ resemble Loranthaceæ from which they differ among other things in the stamens being alternate with the petals and not opposite to them.

GEOGRAPHY. Found all over the temperate parts of Europe, Asia, and America.

PROPERTIES. *Cornus mascula*, and *Benthamia* yield a fruit which is eatable, but not worth eating. The bark of *C. florida* and sericea is said to rank among the best tonics of North America, nothing having been found in the United States that so effectually answers the purposes of Peruvian bark in intermittent fevers. *Barton, 1. 51.* It is a remarkable fact that the young branches of *Cornus florida* stripped of their bark and rubbed with their ends

against the teeth, render them extremely white. *Ibid.* From the bark of the fibrous roots the Indians extract a good scarlet colour. *Ibid. 1. 120.*

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SUB-ORDER. AMYGDALÆ. THE ALMOND TRIBE.

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GEOGRAPHY. Natives exclusively of the northern hemisphere, where they are found in cold or temperate climates. One species, *Cerasus occidentalis*, is a native of the West Indies; a kind of Almond, *Amygdalus microphylla*, inhabits hot arid plains in Mexico; and another, *A. cochinchinensis*, is reputed to grow in the woods of CochinChina.

PROPERTIES. The astringent febrifugal properties of Rosaceæ, with which order these are usually combined, are also found in Amygdalæ; as in the bark of *Cerasus virginiana*, which is prescribed in the United States, and of the *C. capollim* of Mexico. They are, however, better known for yielding an abundance of prussic, or hydrocyanic, acid, a deadly principle residing in the leaves and kernel; in consequence of which some of the species are poisonous to cattle which feed upon them: as, for example, the *Cerasus capricida*, which kills the goats of Nipal; and the *C. virginiana*, which is known in North America to be dangerous. They all of them, also, yield a gum, analogous to gum tragacanth. Notwithstanding, however, the poisonous principle that is present in them, their fruit is, in many cases, a favourite food; that of the *Amygdalus* (peach and nectarine), *Prunus* (plum), and *Cerasus* (cherry), are among the most delicious with which we are acquainted; the seed of *Amygdalus* is familiar to us under the name of almonds, and its oil under the name of oil of almonds. The bark of the root of *Cerasus capollim* is used in Mexico against dysentery. *DC.* The leaves of *Prunus spinosa* (sloe), and *Cerasus avium* (wild cherry), have been employed as a substitute for tea. *Ibid.*

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ORDER CXXXVI. SALICACEÆ. THE WILLOW TRIBE.

GEOGRAPHY. Natives, generally, of the same localities as Betulaceæ, but

uncommonly on high land in the Sandwich Islands.

PROPERTIES. Much the same as those of Ericaceæ: their bark and leaves are astringent, slightly tonic, and stimulating. The berries of many are eaten, under the names of Cranberry, Bilberry, Whortleberry, &c. Several species are choice subjects of the gardener's care.

LOBELIACEÆ

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GEOGRAPHY. Unlike Campanulaceæ, these seem to prefer countries within or upon the border of the tropics to such as have a colder character. We find them abounding in the West Indies, Brazil, the Cape of Good Hope, and the Sandwich Islands; they are not uncommon in Chile, and New Holland.

PROPERTIES. All dangerous or suspicious, in consequence of the excessive acidity of their milk. *L. Cautchouc* is so named by the inhabitants of Popayan from the tenacity of its juice. *Royle.* *Lobelia tupa* yields a dangerous poison in Chile. (The most active article of the North American Materia Medica is said to be the *Lobelia inflata*: it is possessed of an emetic, sudorific, and powerful expectorant effect, especially the first. When given with a view to empty the stomach, it operates vehemently and speedily; producing, however, great relaxation, debility, and perspiration, and even death, if given in over-doses.

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extending further to the north than the species of that order. The most northern woody plant that is known is a kind of Willow, *Salix arctica*. They are found sparingly in Barbary, and there is a species of Willow even in Senegal.

PROPERTIES. Valuable trees, either for their timber or for economical purposes; the Willow, the Sallow, and the Poplar, being the representatives. Their bark is usually astringent, tonic, and stomachic; that of *Populus tremuloides* is known as a febrifuge in the United States; the leaves of *Salix herbacea*, soaked in water, are employed in Iceland for tanning leather. Willow bark has been found by Davy to contain as much tanning principle as that of the Oak. *Ed. P. J. 1. 320.* It has lately acquired a great reputation in France as a febrifuge. A crystallizable principle, called *Salicine*, has been obtained from *Salix helix*, which, according to Majendie, arrests the progress of a fever with the same power as sulphate of quinia. (See *Journal of the R. Inst. Oct. 1830, p. 177.*)

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ORDER CLXVII. VACCINACEÆ. THE BILBERRY TRIBE.

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GEOGRAPHY. Natives of North America, where they are found in great abundance as far as high northern latitudes; sparingly in Europe; and not

Barton, 1. 189. The anti-syphilitic virtues ascribed to *Lobelia syphilitica* are supposed to have resided in its diuretic property; they are, however, generally discredited altogether. *Ibid.* 2. 211. *Lobelia longiflora*, a native of some of the West India Islands, is one of the most venomous of plants. The Spanish Americans call it *Rebenta Cavallos*, because it proves fatal to horses that eat it, swelling them until they burst. Taken internally, it acts as a violent cathartic, the effects of which no remedy can assuage, and which end in death. The leaves are an active vesicatory. *Lobelia cardinalis* is an acrid plant which is reckoned an anthelmintic. *Ibid.* 2. 180.

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GEOGRAPHY. Found commonly in the ditches and marshes of the northern parts of the world, but uncommon in tropical countries; a species is found in St. Domingo, and another in New Holland. Two are described from equinoctial America.

PROPERTIES. Of little known use. The powdered flowers have been used as an application to ulcers. The pollen of *Typha* is inflammable, like that of *Lycopodium*, and is used as a substitute for it. De Candolle remarks that it is probable the facility of collecting this pollen is the real cause of its use, and that any other kind would do as well.

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GEOGRAPHY. As nothing can be uninteresting which is connected with the habits of a tribe of such vast importance to man, I extract the following account of the geographical distribution of Grasses by Schouw, from Jameson's *Philosophical Journal* for April 1825:—

"The family is very numerous: Persoon's *Synopsis* contains 812 species, 1-26th part of all the plants therein enumerated. In the system of Røemer and Schultes there are 1800; and, since this work, were it brought to a conclusion, would probably contain 40,000 in all, it may be assumed that the Grasses form a 22d part. It is more than probable, however, that in future the Grasses will increase in a larger ratio than the other phanerogamic plants, and that perhaps the just proportion will be as 1 to 20, or as 1 to 16. Greater still will be their proportion to vegetation in general, when the number of individuals is taken into account; for, in this respect, the greater number, nay, perhaps the whole, of the other classes are inferior.

With regard to *locality* in such a large family, very little can be advanced. Among the Grasses there are both land and water, but no marine, plants. They occur in every soil, in society with others, and alone; the last to such a degree as entirely to occupy considerable districts. Sand appears to be less favourable to this class; but even this has species nearly peculiar to itself.

"The *diffusion* of this family has almost no other limits than those of the whole vegetable kingdom. Grasses occur under the equator; and *Agrostis alga* was one of the few plants which Phipps met with on Spitzbergen. On the mountains of the south of Europe, *Poa disticha* and other Grasses ascend almost to the snow-line; and, on the Andes, this is also the case with *Poa malulensis* and *dactyloides*, *Deyeuxia rigida* and *Festuca dasyantha*.

The greatest differences between tropical and extra-tropical Grasses appear to be the following:—

"1. The tropical Grasses acquire a much greater height, and occasionally assume the appearance of trees. Some species of *Bambusa* are from 50 to 60 feet high.

"2. The leaves of the tropical Grasses are broader, and approach more in form to those of other families of plants. Of this the genus *Paspalus* affords many examples.

"3. Separate sexes are more frequent in the tropical Grasses. *Zea*, *Sorghum*, *Andropogon*, *Olyra*, *Anthistiria*, *Ischæmum*, *Ægilops*, and many other genera, which only occur in the torrid zone, and are there found in perfection, are monœcious, or polygamous. *Holcus* is perhaps the only extra-tropical genus with separate sexes.

"4. The flowers are softer, more downy, and elegant.

"5. The extra-tropical Grasses, on the contrary, far surpass the tropical in respect of the number of individuals. That compact grassy turf, which, especially in the colder parts of the temperate zones, in spring and summer, composes the green meadows and pastures, is almost entirely wanting in the torrid zone. The Grasses there do not grow crowded together, but, like other plants, more dispersed. Even in the southern parts of Europe, the assimilation to the warmer regions, in this respect, is by no means inconsiderable. *Arundo donax*, by its height, reminds us of the Bamboo; *Saccharum Ravenaræ*, *S. Teneriffæ*, *Imperata arundinacea*, *Lagurus ovatus*, *Lygeum spartum*,

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and the species of *Andropogon*, *Ægilops*, &c. by separate sexes, exhibit tropical qualities. The Grasses are also less gregarious, and meadows seldomer occur, in the south than in the north of Europe.

THE MUSHROOM TRIBE.

ORDER CCLXXXIX. FUNGI, or FUNGACEÆ.

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Some writers have questioned the propriety of considering Fungi as plants, and have proposed to establish them as an independent kingdom, equally distinct from animals and vegetables; others have entertained doubts of their being more than mere fortuitous developments of vegetable matter, called into action by special conditions of light, heat, earth, and air—doubts which have been caused by some remarkable circumstances connected with their development, the most material of which are the following: they grow with a degree of rapidity unknown in other plants, acquiring the volume of many inches in the space of a night, and are frequently meteoric, that is, spring up after storms, or only in particular states of the atmosphere. It is possible to increase particular species with certainty, by an ascertained mixture of organic and inorganic matter exposed to well-known atmospheric conditions, as is proved by the process adopted by gardeners for obtaining *Agaricus campestris*, a process so certain, that no one ever saw any other kind of *Agaricus* produced in Mushroom-beds; this could not happen if the Mushroom sprang from seeds or

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"Hence it appears, that, in respect of the predominating kinds of grain, the earth may be divided into five grand divisions, or kingdoms. The kingdom of Rice, of Maize, of Wheat, of Rye, and lastly of Barley and Oats. The first three are the most extensive; the Maize has the greatest range of temperature; but Rice may be said to support the greatest number of the human race."

PROPERTIES. The uses of this most important tribe of plants, for fodder, for food, and for clothing, require little illustration. The abundance of whole-some facula contained in all their seeds renders them peculiarly well adapted for the sustenance of man; and if the Corn tribe only, such as Wheat, Barley, Oats, Maize, Rice, and Guinea Corn, are the kinds commonly employed, it is because of the large size of their seeds compared with those of other Grasses for none are unwholesome in their natural state, with the single exception of *Lo-*

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lium temulentum, a common weed in many parts of England, the effects of which are undoubtedly deleterious, although perhaps much exaggerated. In this respect an approach seems to be naturally made to the properties of half-putrid Wheat, which are known to be dangerous.

sporules floating in the air, as in that case many species would necessarily be mixed together; Fungi are often produced constantly upon the same kind of matter, and upon nothing else, such as the species that are parasitic upon leaves; all which is considered strong evidence of the production of Fungi being accidental, and not analogous to that of perfect plants. **Fries, how-**

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ever, whose opinion must have great weight in all questions relating to Fungi, argues against these notions in the following manner: "The sporules are so infinite (in a single individual of *Reticularia maxima* I have counted above 10,000,000), so subtle (they are scarcely visible to the naked eye, and often resemble thin smoke), so light (raised, perhaps, by evaporation into the atmosphere), and are dispersed in so many ways (by the attraction of the sun, by insects, wind, elasticity, adhesion, &c.), that it is difficult to conceive a place from which they can be excluded."

I give his words as nearly as possible, because they may be considered the sum of all that has to be urged against the doctrine of equivocal generation in Fungi; but without admitting, by any means, so much force in his statement as is required to set the question at rest. In short, it is no answer to such arguments as those just adverted to. It seems to me that a preliminary examination is necessary into the existence of an exact analogy between all the plants called Fungi; a question which must be settled before any further inquiry can be properly entered upon.

That a number of the fungus-like bodies found upon leaves are mere diseases of the cuticle, or of the subjacent tissue, is by no means an uncommon opinion; that many more are irregular and accidental expansions of vegetable tissue in the absence of light, is not improbable; and it is already certain that no inconsiderable number of the Fungi of botanists are actually either, as various *Rhizomorphas*, the deformed roots of flowering plants growing in cellars, clefts of rocks, and walls; or mere stains upon the surface of leaves, as *Venularia grammica*; or the rudiments of other Fungi, as many of Persoon's *Fibrillarias*.

Those who are anxious to inquire into these and other points, are referred to Fries' works generally, to the various writings of Nees von Esenbeck, and to the Scottish Cryptogamic Flora of Greville. In the ensuing list of genera, I have chiefly availed myself of the writings of Fries; but I must confess that in the *Gasteromycetes* and *Coniomycetes* the opinions of that learned Botanist are so unsteady, that I cannot but view the whole subject as being still in want of much more investigation.

GEOGRAPHY. The Fungi by which most extra-tropical countries are inhabited are so numerous, that no one can safely form even a conjecture as to the number that actually exists. If they are ever fortuitous productions, the

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number must be indeterminable; if many are mere diseases and the remainder fixed species, then the knowledge of their nature must be reduced to a more settled state before any judgment upon their number can be formed.

According to Fries, he discovered no fewer than 2000 species within the compass of a square furlong in Sweden; of *Agaricus* alone above 1000 species are described; and of the lower tribes the number must be infinite. Sprengel, however, does not enumerate in his *Systema Vegetabilium* more than between 2700 and 2800; but when we consider that his genus *Agaricus* does not go beyond number 646, although 1000 at least are described, it is not improbable that the rest of his enumeration is equally defective, and that the number of described Fungi perhaps amounts to between 4 and 5000.

Of tropical species we know but little; their fugitive nature, the difficulty of preserving them, and perhaps the incuriousness of travellers, as well as their scarcity in the damp parts of equinoctial countries, have been the causes of the proportion in such climates between Fungi and other plants being unknown.

PROPERTIES. A large volume might be written upon the qualities and uses of Fungi, but in this place they can only be briefly adverted to in a very general way. They may be said to be important, either as food or as poison, or as parasites destructive to the plants upon which they grow.

As food, the most valuable are the *Agaricus campestris*, or common Mushroom, the various species of *Helvella* or Morel, and *Tuber* or Truffle; but a considerable number of other kinds are used for food in various parts of the world, of which a useful account will be found in De Candolle's excellent *Essai sur les Propriétés Médicales des Plantes*, in Persoon's work *Sur les Champignons comestibles*, and in a paper by Greville in the 4th volume of the *Transactions of the Wernerian Society*.

"This variety of *Amanita muscaria* is used by the inhabitants of the north-eastern parts of Asia in the same manner as wine, brandy, arrack, opium, &c. is by other nations. Such Fungi are found most plentifully about Wischna, Kamchatka, and Wilkowa Dercona, and are very abundant in some seasons, and scarce in others. They are collected in the hottest months, and hung up by a string in the air to dry: some dry of themselves on the ground, and are said to be far more narcotic than those artificially preserved. Small deep-coloured specimens, thickly covered with warts, are also said to be more powerful than those of a larger size and paler colour. The usual mode of taking the Fungus is, to roll it up like a bolus, and swallow it without chewing, which, the Kamchatkades say, would disorder the stomach. It is sometimes eaten fresh in soups and sauces, and then loses much of its intoxicating property: when steeped in the juice of the berries of *Vaccinium uliginosum*, its effects are those of strong wine. One large, or two small Fungi, are a common dose to produce a pleasant intoxication for a whole day, particularly if water be drank after it, which augments the narcotic

It is necessary to exercise the utmost care in employing Fungi, the nature of which is not perfectly well ascertained, in consequence of the resemblance of poisonous and wholesome species, and the dreadful effects that have followed their incautious use. It is true that many kinds are named by Pallas as being commonly used by the Russians, which are plentiful in countries where they are not employed for food; but, in the first place, it is not perhaps quite certain that poisonous and wholesome species are not confounded under the same name; in the next place, climate may make a difference; and lastly, much depends upon the mode in which they are cooked.

One of the most poisonous of our Fungi is the *Amanita muscaria*, so called from its power of killing flies when steeped in milk. Even this is eaten in Kamchatka, with no other than intoxicating effects, according to the following account by Jaegersdorff, as translated by Greville, from whom I borrow it.

principle. The desired effect comes on from one to two hours after taking the Fungus. Giddiness and drunkenness result in the same manner as from wine or spirits; cheerful emotions of the mind are first produced; the countenance becomes flushed; involuntary words and actions follow, and sometimes at last an entire loss of consciousness. It renders some remarkably active, and proves highly stimulant to muscular exertion: by too large a dose, violent spasmodic effects are produced. So very exciting to the nervous system in many individuals, is this Fungus, that the effects are often very ludicrous. If a person under its influence wishes to step over a straw or small stick, he takes a stride or a jump sufficient to clear the trunk of a tree; a talkative person cannot keep silence or secrets; and one fond of music is perpetually singing. The most singular effect of the *Amanita* is the influence it possesses over the urine. It is said that, from time immemorial, the inhabitants have known that the Fungus imparts an intoxicating quality to that secretion, which continues for a considerable time after taking it. For instance, a man moderately intoxicated to-day will, by the next morning, have slept himself sober, but (as is the custom), by taking a teacup of his urine he will be more powerfully intoxicated than he was the preceding day. It is, therefore, not uncommon for confirmed drunkards to preserve their urine as a precious liquor against a scarcity of the Fungus. The intoxicating property of the urine is capable of being propagated; for every one who partakes of it has his urine similarly affected. Thus, with a very few *Amanitæ*, a party of drunkards may keep up their debauch for a week. Dr. Langsdorf mentions, that by means of the second person taking the urine of the first, the third of the second, and so on, the intoxication may be propagated through five individuals."

Of parasitical Fungi, the most important are those which are called dry rot, such as *Polyporus destructor*, *Merulius lacrymans* and *vastator* &c., which are the pest of wooden construction: next to these come the blight in corn, occasioned by *Puccinia graminis*; the smut and ergot, if they are really any thing more than the diseased and disorganised tissue of the plants affected; the rust, which is owing to the ravages of *Æcidiums*; and finally, in this class is to be included what we call mildew, minute simple articulated *Mucors*, and *Mucedos*. The genus *Rhizomorpha*, which vegetates in dark mines far from the light of day, is remarkable for its phosphorescent properties. In the coal mines near Dresden the species are described as giving those places the air of an enchanted castle; the roof, walls, and pillars, are entirely covered with them, their beautiful light almost dazzling the eye. The light is found to increase with the temperature of the mines. *Ed. P. J. 14.*

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178. It is a most remarkable circumstance, and one which deserves particular inquiry, that the growth of the minute Fungi, which constitute what is called mouldiness, is effectually prevented by any kind of perfume. It is known that books will not become mouldy in the neighbourhood of Russia leather, nor any substance, if placed within the influence of some essential oil. *Ibid. 8.*
34. *Boletus ignarius* is used in India as a styptic, as well as for Amadou. *Ainslie, 1. 5.* The *Boleti*, when wounded, heal much in the same manner as the flesh of animals. *Edin. Philosoph. Journ. 14. 369.*

426 ORDER CCXC. LICHENES,

or
LICHENACEÆ.

THE LICHEN TRIBE.

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AFFINITIES. According to Fries, Lichens are types of *Algæ* born in the air, interrupted in their development by the deficiency of water, and stimulated into forming a nucleus (or receptacle of sporules) by light. No Lichen is ever submersed; there is none of which the vegetation is not interrupted by the variable hygrometrical state of the atmosphere; and, finally, none that ever developes in mines, caverns, or places deprived of light.

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I have taken that of Fries as explained in his *Syst. Orb. Veg. p. 233*, making such additions as I have been able. There are some important remarks by Fée upon the thecæ of these plants, and the principles on which their genera are to be formed, in the *Botanische Zeitung* for 1835, p. 81.

AFFINITIES. Whatever ingenuity may be employed in determining the relative degree of dignity in the vegetable creation between Fungi, Lichens, and *Algæ*, it seems to me that the conclusion which is constantly arrived at is, that *Algæ* are absolutely distinguishable from the two others only by their living in water, and that, except for the influence which that medium exercises on them, they would be identical with Lichens on the one hand, and with Fungi on the other.

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Chorda filum, a species common in the North Sea, is frequently found of the length of 30 or 40 feet. In Scalpa Bay, in Orkney, according to Mr. Neill, this species forms meadows, through which a pinnacle with difficulty forces its way. *Lessonia fuscens* is described by Bory de St. Vincent as 25 or 30 feet in length, with a trunk often as thick as a man's thigh. But all these, and indeed every other vegetable production, is exceeded in size by the prodigious fronds of *Macrocystis pyrifera*. "This appears to be the sea-weed reported by navigators to be from 500 to 1500 feet in length."

Fries refers *Bysaceæ* to Lichens with the following short character:—"Aerial, perennial, constantly growing, with a filamentous texture; consisting of solid fibres (either few or several glued together with a common bark), unchanged and permanent. Fructification homogeneous, growing externally, and naked." *Syst. Orb. Veg. 291.* Some of these plants appear to be meretric productions; on one occasion they are said to have suddenly overrun all the leaves of pines on the side next the wind in the neighbourhood of Dresden; on another, on the 29th of Aug. 1830, to have in an instant spread over the sails and masts of a ship at Stockholm; and Fries is disposed to consider the cobweb-like matter that overruns the grass in the mornings of spring and autumn, of this nature, and not of an animal origin. *Sec. S. O. Veg. 318.*

ORDER CCXCI. *ALGÆ*,
or
ALGACEÆ. } THE SEA-WEED TRIBE.

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CAROLI LINNÆI

SAC. REG. MAJ. SVEC. ARCHIAT.

MED. ET BOT. PROF. UPSALIENS. ACAD. IMP.

MONSP. BEROL. TOLOS. UPS. STOCKH. SOC.

AMOEINITATES
ACADEMICÆ;

SEU

DISSERTATIONES VARIE,
PHYSICÆ, MEDICÆ
BOTANICÆ,

ANTEHAC SEORSIM EDITÆ

NUNC COLLECTÆ ET AUCTÆ

CUM TABULIS ÆNÆIS.

VOLUMEN SECUNDUM.

Cum Grat. & Priv. S. R. Maj. Svec. & S. R. Maj. Polon. de Elect. Saxon.

HOLMIE,

APUD LAURENTIUM SALVIUM.

MDCCL. 1754

OECONOMIA NATURÆ,

Quam
PRÆSIDE

DN. D. CAROLO LINNÆO,

Publico examini submitit
ISACUS J. BIBERG,
Medelpadus.

Upsalæ 1749. Mart. 4.

NATURÆ.

9

viridantes undique arbores commonstrat: animalibus vigorem conciliat, eaque obesciora reddit: immo fructus tunc maturefcunt, prata rident, cetera vigent. *Autumnus* contra funestus est, quippe quo arborum folia decidunt, plantæ marcescunt, Insecta sopore corripuntur & animalium multa in consveta hibernacula semet recipiunt.

DIES, quorum ruit annus, eodem passu ambulat: *Tempus matutinum* omnia promtiora efficit, & muneribus obcundis reddit alacriora. Sol rutilantes radios spargit; flores quos nocturnus quasi sopor occupaverat, denuo evigilantes expanduntur; aves sonoris vocibus atque multiplici concentu silvas personantes reddunt, quo ipsi, horis veneri dicatis, in numerosa convocantur examina. *Meridies* animalia in pascua & campos elicit, utque corpora curent svadet æstus, urget necessitas. *Vespera* subsecquitur, omniaque & singula efficit segniora: flores connivent, & animalia suas latebras repetunt. Sic vernalis tempus, matutina hora, nostraque juvenilis ætas ad *generationem* quadrat: Æstas, meridies & virilis toga cum *conservatione* conveniunt: autumnus vero, vespersa & tristis senectus *destructio*. *ni* haud inepte assimulantur.

S. III.

REGNUM LAPIDEUM.

Propagatio.

LAPIDES organica non esse corpora, uti Plantæ & Animalia, cuique constat, adeoque

8 XIX. OECONOMIA

rum accommodator evadit: immo nive femina & radices plantarum obteggit & sic frigore a frigoris vi defendit. Mitto, quod frigus temperet puramque efficiat atmosphæram & aquam putridam, ut animalibus magis salutaris reddatur.

CALORIS frigorisque perpetua apud nos vicissitudo gratiores æstates subministrat: & quamvis hiems varias quidem e nostris terris plantas variæque animalia pellat, tamen perpetua æstas inter Tropicos non multo gravior est, quippe quæ nimio æstu homines & animalia sæpe prostermit, licet fructibus desideratissimis istæ regiones abundant. Nostræ quidem hiemes, quantumvis magnam orbis partem implacabili rigore vexent, minus tamen borealium accolis ipsas nocere, loquitur experientia. Hinc per totum orbem satis commode vivitur, quum varia tellus vario naturæ beneficio quaquaversum perfruatur.

TEMPORA, sicut omnia suis vicissitudinibus obnoxia sunt, sua habent initia, faciunt progressiones & extremos attingunt fines.

ÆTAS hominis ab ipsis incipit incunabulis; grata subsecquitur *pueritia*, fervidam *juventutem* excipit *virilitas* firma, severa, suæque conservationi intenta, usque dum *senectus* debilet, & nutantia corpora penitus destruat.

ANNI partes eandem scenam ludunt. *Ver*, ludibunda illa omnium viventium infantia; pueritia & juventutem repræsentat; Namque hoc tempore plantæ suis floribus superbiunt, pisces exfultant, aves cantillant, pleraque venere turgescent. *Æstas*, mediæ ætati similis, plantas &

que genera diversissime inter se unita & commixta, tot etiam prodeunt in Regno Lapideo species vel varietates, usibus variis pro cuiusvis indole ac natura, inservitura.

§. IV.

Conservatio.

Quemadmodum vita & organisimò destituntur lapides, & duriores sunt, nec putredini aut accrescentiæ obnoxii, sic etiam præ ceteris omnibus diutissime perdurant. Hanc in rem quantum conferat aer facile intelligitur, qui in superficie terræ varios lapides indurat, quo ipso redduntur solidiores, compactiores & contra temporis injurias multo constantiores. Sic *Calcarii lapides*, sub dio diutius existentes, duriores evadunt, id quod ex observationibus vulgi notissimum (*m*). *Marga Cretacea*, ex qua lapides ad extruenda Flandriæ ædificia eruntur, quamdiu in fodina maneat friabilis est; inde vero producta atque liberò aëri exposita, sensim sensimque indurescit. *Muri nostri & arces vetustiores* pari ratione firmitudinem suam temporis successu nanciscuntur, quare majores nostros in arte murorum extruendorum hodiernis artificibus præstitisse, perperam vulgò creditum est.

Causa utut etiamnum lateat, cur findantur passim prægrandes petrae rupesque, unde non raro ingentia divelluntur fragmenta, id tamen observatum est, ab intercedente aqua in iisdem retenta concrefcere fissuras, & *Quartzum* aut *Spatum* consolidari. Hinc *Quartzum* vix alicubi repe-

(m) It. Gerl. 37.

reperies nisi in illis lapidibus, qui aquam particulis lapideis inquinatam, aliquamdiu intra suas rimas retinuerunt. *CrySTALLI* haud absimili ratione cavitates in fodinis replent, inque *Quartzum* concrefcunt.

Lapides quotannis non tantum ex crusta novis inducta generari, accrescere & mutari, sed etiam ex *Quartzo* & *Spatum* augeri, manifestum est; ut taceam terram adiacentem, præsertim si particulis ferreis imprægnata fuerit, in consistentem lapidem communitè immutari. *Marmoreos montes* in Italia, intra ipsius terræ gremium, unde fragmenta excisa fuerunt, iterum adaugeri perhibetur (*n*). *Mineræ* paulatim accrescunt, quod tunc particulae minerales, mediante aqua per montium cryptas transvectæ, fissuris ipsarum retinentur, adeo ut materiæ homogeneæ diutius adherendo, tandem ejus naturam adoptent inque consimilem substantiam transmutentur.

§ V.

Destitutio.

Lapides, licet corpora sint durissima, tamen destructionis legibus æque ac reliqua corpora creata subiecti deprehenduntur. Solvuntur enim ab elementis vario modo vim suam in illos exercantibus, uti aqua, aëre, radiisque solaribus, nec non mediante rapiditate fluviorum & cataractarum violentia, quarum voragines, ut & continuati aquarum impetus, ab alveorum præcipitiis incitati, durissimas rupes in pulverem redigunt. Maribus & lacuum agitationes fluctuantque sævitia,

(n) Wall. Min. p. 2.

flores splendente sole sese expandant, ingruente vero nimbo, pluvia, noctuque connivant, ne ab aqua, farina genitalis coaguletur vel inutilis reddatur, quo minus ad stigmata efflari queat; at mirum! stigmatate fecundato, nec vespere, nec pluvia ingruente sese contrahunt flores. Hinc quando multum pluviae sub florescentiae tempore cadit, haud immerito annonae caritatem augurantur agricolae & hortulani. Hæc omnia pluribus egregiis exemplis illustrare possem, nisi eadem materia nuper pro dignitate ex hac cathedra fuisset exposita (t). Meminisse tantum insuper juvat, quod plantarum genitalia, quæ in Regno Animali, utpote fere pudenda, plerumque a natura absconduntur, in Regno Vegetabili omnium oculis exponantur, & quando hæc celebrantur nuptiæ, mirum est, quantas delicias afferant spectatori, dum colore gratissimo & odore jucundissimo sensus reficiunt omnium. Quid? quod eodem tempore ex florum nectariis mel hauriunt apes, musca, aliaque Insecta, ut *Trochilum* taceam, & ex eorum polline effocto ceram colligunt itidem apes.

§. VII.

DISSEMINATIO feminum, postquam ad maturitatem pervenerunt, sicut maxime necessaria, quippe sine qua nulla subsequeretur messis, sic etiam naturæ Auctor huic rei peragenda, multis immo infinitis modis sapientissime prospexit. Huic scilicet negotio favent *Pedunculi* & *Caulis*, qui fructum plerumque a terra elewant, ut quassantes venti matura femina late dispergere poss-

(t) *Wahlon* Sponsal. Plantarum *Amen. Acad. I. p. 327.*

possint. *Pericarpia* pleraque sese summitatibus claudunt, ne decendant femina antequam matura procellis ejiciantur. ALÆ multis feminibus datæ sunt, quarum auxilio longe a matre evolant, & sæpe totam regionem peragunt; ALÆ autem hæc vel pappo constant, ut in plantis plerisque compositis, vel membrana, ut in *Betula*, *Alno*, *Fraxino* &c. Hinc silvæ, incendio vel alio modo consumptæ, novis plantis brevi disseminatis denuo impleri possunt, quæ alias steriles campos haberent. *ELASTICITATE* notabili multi fructus gaudent, vi cujus, matura pericarpia, femina longe projiciunt, ut *Oxalis*, *Euphorbie*, *Phyllanthus*, *Dictamnus*. *HISPIDA* & *basis quasi instructa* sunt alia femina aut pericarpia; hinc ejusmodi femina prætereuntibus animalibus adhærere possunt, usque mediantibus usque ad eorum cubilia duci, ubi & seruntur & stercoantur, mira naturæ cura, quare etiam horum feminum plantæ crescunt, ubi alia reculant, ut *Cynoglossum*, *Agrimonia* &c.

BACCÆ & pericarpia dantur in plurimis plantis a natura in alimentum animalibus concessa, ea vero conditione, ut dum pulpam edunt, femina deinceps serant; nam cum baccarum pulpam devorant, femina aut simul dispergunt, aut deglutita duplici deinde fœnore reddunt, quoniam, si integra ventriculum intrant, illa semper exeunt. Hinc non mirum, quod, si recenti fimo vel stercore non putrefacto saturetur ager, simul cum frumento lato variæ alia excrescant plantæ, quæ agricolis molestiam facefunt. *Hordeum* aut *Secale* satum, commutatum fuisse in *avenam*, li-

inſar pluviae inviſibilis diſperſa, juxta naſcentes plantas humectat. Pleræque demum arbores fructus ferunt carnoſos, baccas vel poma, quæ ab inſultu pecorum intacta matureſcunt, eo quod non æque facile ab iis attingantur, ac ſi in plantie terræ creſcerent, adeoque fructus maturi in uſum hominum & animalium cedere, femina vero animalium ope diſpergi poſſunt. Inſuper in earum foliis ova ſua potiſſimum deponunt inſecta, ut arborum ſtructuræ eorum quoque propagationi inſerviat.

SEMPERVIRENTES arbores & frutices in ſteriliſſimis ſilvis plerumque apud nos degunt, ut hibernacula ſint animalibus : folia tertio tantum quovis anno deponunt, cum ipſis ad regumẽtum non egeant femina a Muſcis ſaris cuſtodia. Palmæ vero in calidis regionibus folia perpetuo retinent, quippe quorum auxilium, ad ſeminum a frigore conſervationem, illis in locis haud neceſſarium.

SPINOSÆ ſunt multæ plantæ & frutices, e. g. *Rhamnus*, *Prunus*, *Carduus*, *Onopordon* &c. ut ſuis ſpinis animalia arceant, quæ alias earum fructus facile deſtruerent, Hæ ſimul ſub ſuo ſinu varias alias plantas, præſertim annuas recondunt; ut, dum campi adjacentes animalium voracitate, plantis omnibus ſpoliati ſunt, nonnullæ ſub ſpinis conſerventur, quæ flores fructusque maturant, & feminibus ſuis loca adjacencia ſerunt, ne penitus exſtirpentur.

HERBÆ omnes foliis ſuis terram tegunt, ſuaque adeo umbra efficiunt, ut humor aqueus, unde ipſæmet alantur, haud facile ſolis æſtu exſicc-

SUCCULENTÆ plantæ omnes reddunt humum tenuiſſimam, optimam, copioſiſſimam uti *Sedum*, *Craſſula*, *Aloe*, *Algæ* &c. Siccæ autem plantæ ſterilem magis terram cauſant; ut *Erica*, *Pinus*, *Muſci*; hinc Natura collocavit plantas ſucculentas in rupibus & collibus ſiccifiſſimis.

§. XI.

REGNUM ANIMALE.

Propagatio.

Generatio Animalium inter omnia, quæ admirationem noſtram circa opera Creatoris excitare valent, principem tenet locum. Inprimis vero ſumma digna eſt attentione illa Creatoris ordinatio, qua foetus conceptionem ejusque excluſionem ita inſtituit, ut cujuſcunque animalis indoli ac vivendi generi ſit accommodata.

Oeſtro venero omnes animalium ſpecies ſagrarẽ cernimus, qui his inditus eſt omnibus ac ſingulis, ut mandatum Creatoris exſequantur: *Creſcite & multiplicamini*; ſicque ut ovum, in quo rudimentum foetus continetur, foecundatum fiat, ſine foecundatione enim ova omnia ad prolem in lucem enitendam inepta ſunt. Hocce eodem oeſtro perciti *Vulpes* & *Lupi* ubique in ſilvis ululant, *Canes* multi caniculam ſeqvuntur, *Tauri* ovam frontem præ ſe ferunt, quæ incaſtratis ſerena redditur. *Cervi* excella ſua cornua quotannis recutiant, quæ poſt peractam venerem amittunt. *Aves* venuſtate nitent & per totum ſere diem laſcivia canunt, adeo ut *Paſſer* paſſerem cantu vincat & *Gallus* cum gallo vocis ipeat certamen. *Pavo-*

Pavones caudam formosissimam speciosissimamque resumunt.

Pisces in aqua congregantur & exsultant.

Grylli & *Cicadæ* inter plantas strident & tibias veluti insilant.

Formicæ in colonias quasi & urbes colliguntur. Quæ deinceps circa hanc rem dici possunt, brevitati litantes sicco, quod ajunt, pede præterimus.

S. XII.

Ovum fecundatum calore opis habet certo & proportionato, ad expansionem flaminum embryonis. Hic ut obtineatur, variis modis operatur natura, ideoque in diversis animalium classibus, diversam deprehendimus rationem, qua foetus excluditur.

QUADRUPEDIUM feminæ utero sunt instructæ, quem commode gestare possunt, & sic foetum temperato fovere calore, & commodo sustentare nutrimento, dum earum pleræque in telluris superficie degunt, ibique nutriuntur.

AVES, ob suam sustentationem vitæ, aliasque prægnantes causas, locum mutare necessum habent, idque non pedibus incedendo quatiuntur, sed Alis aërem secando. His igitur uteri gestatio nimis foret ponderosa, ea propter ova dura, testa obducta ponunt; hæc incubando, ex solo naturæ impulsu, tam diu foveant, usque dum pulvis in lucem proveniat.

Strutio & *Casuarus* fere inter aves solus ab hac lege recedit; qui ova sua arenæ concredit, ubi ardor solis intensior illa excludit.

PISCES,

Benigna circa hoc natura, innocua & esculenta animalia fecunda generavit. Plin. Ab hoc cuilibet determinato ovorum numero, natura eo magis recedere vetat, quod si quis avibus aliquoties ova, quæ ad incubanda posuerunt, eripiat, amissis mox totidem alia substituant, ut de Hirundine, Anatibus & Passeribus observatum est.

S. XIV.

Conservatio.

Conservatio propagationem excipit; Illa vero in primis in tenera ætate clucet, dum pulli adhuc ipsi vitæ suæ sustentationi providere nequeunt. Factum scilicet est, ut parentes vel ferocissimæ insigni tangantur *σπρῆ* sive amoris fere erga prolem enixam, & alimenti, custodiæ & conservationis earum curam agant, idque secundum legem non fictam, sed ab ipso naturæ Domino latam.

QUADRUPEDIA tamdiu tenero foetui ubera præbent, & liquore, lacte chyloso sustentant, quo ad viscera ejus solidiori cibo digerendo paria, & dentes cibo masticando apti evadant. Immo amor eorum erga pullos eousque sese extendit, ut omnia, quæ perniciem & detrimentum illis minitantur, omninifugantur. *Ovis*, quæ binos uno partu peperit agnos, non ad ubera admittit unum, nisi simul adsit & fugat alter, ne unus fame pereat, dum alter optime alitur.

AVES nidös artificiosissime struunt, eosque quam possunt mollissime subternunt, ne ova aliquo modo lædantur. Nec illos promiscue omnibus in locis condunt, sed illa tantum eligunt, in

alia rustici Europæi, alia Hottentotti & hominis silvestris; stupenda vero Oeconomia Divina non est nisi una per totum orbem conspicua; & si natura ad nostram opinionem non semper justos posuerit calculos, haud aliter est intelligendum, ac cum varinautæ ventum secundum, quilibet ad suam destinatum portum, expectant, quibus omnibus simul satisfieri nequit.

§. XIX.

CADAVERIBUS foetidisque corporibus totus orbis oneraretur, nisi quædam animalia illa etiam in deliciis haberent.

Cum itaque animal aliquod emoritur, nullum perdunt momentum *Ursi, Lupi, Vulpes, Corvi* &c. antequam omnia e medio auferant.

Si vero e. g. Equus juxta vias publicas occumbit, ubi Ferae haud accedere audent, eum post aliquot dies tumidum, ruptum, tandemque innumeris *muscarum carnivorum* larvis implentem deprehendes, a quibus totus quantus cito consumitur & remouetur, ne diu venenato foetore prætereuntibus molestiam pariat.

Piscium cadavera, dum ad litora prope huntur, pisces voraces, ut *Rajæ, Squali, Murænæ* &c. se illuc ad edendum conferunt; quoniam vero fluxus & refluxus maris cito statum mutet, in caveis ipsæ sæpe detinentur & cibum feris præbent, litora occupantibus. Sic terra non tantum cadaverum putredine purgatur, sed variis etiam animalibus, necessaria vitæ sustentatio per œconomiam Naturæ procuratur.

Pari

Pari modo, suum & aliorum commodum promovent multa Insecta.

Culices, dum in aquam stagnantem, putridam & foetentem numerosa ova immittunt, omnem ejus aquæ putredinem comedunt enatæ Larvæ, id quod luculenter patebit, si quis experimentum eo modo instituere velit, ut duo vasa aqua putrefacta repleat, inque altero eorum culicum larvas relinquat, alterum vero ab illis bene secernat. Hoc facto brevi reperiet aquam, culiculis impletam, puram esse, absque ullo foetore, alteram vero ab illis vacuum. continuo foetentem.

Pediculi in capitibus infantum, scabie infectis, mirum in modum augentur, nec sua utilitate in eo destituuntur, quod abundantem humorem consumant.

Scarabei, æstivo tempore, e pecorum stercorebus omne humidum & glutinosum extrahunt, unde postea veluti pulvis super terram per ventos disparguntur; Hoc nisi fieret, tantum abest, ut vegetabilia subjacentia inde pinguescerent, quin potius totus ille locus sterilis foret.

Canum excrementa, cum adeo tetra & septica sint, ut a nullis adpetantur Insectis, eorumque ope sic dispergi nequeant, cautum est, ut in lapide, trunco, aliove eminentiori loco alium plerumque exonerent canes, ne vegetabilia exinde destruantur.

Feles autem propria excrementa in terram defodiunt. Nihil tam vile, nihil tam parvum, in quo non elucet mirificus naturæ ordo & sapiens dispositio.

D 4

§. XX.

CAROLI LINNAEI

ORATIO

DE
TELLURIS HABITABILIS INCREMENTO

HABITA, CUM

MEDICINAE LICENTIATUM

IOHANNEM WESTMANNUM

MEDICINAE DOCTOREM

IN ACADEMIA REGIA UPSALIENSI

ANNO MDCCXLIII. APRILIS 12.

MORE MAJORUM

RENUNCIARET.

Fundam. Botanic. S. 132.

Initio rerum, ex omni Specie viventium,

Unicum Sexus par creatum fuisse, PA.
suadet ratio.

PATRONIS,

HOSPITIBUS,

PATRIBUS CIVIBUSQUE
ACADEMICIS ET URBICIS.

S. P. D.

CAROLUS
LINNAEUS,

MEDICINAE ET BOTANICES PROFESSOR

REG. ET ORD.

Nec non

in Solenni hac Inauguratione Medica
constitutus

PROMOTOR.

Historia Naturalis indies nostro aevō tanta
luce Medicinam collustrat, quantam
antiqui, ne quidem per somnium, un-
quam viderunt. Cogitemus modo nova illa,
que aliquot abhinc annis, Naturæ Mystæ de-
texere,

Exborum numero jam publico sistimus novum Medicum, Licentiatum D. JOHANNEM WESTMAN, qui integro decennio ad banc Academiam indefessus Æsculapii sacris operatus est; Examina in Theologia, Philosophia & utrumque in Medicina rite præstitit. Binas de Hydropse Dissertationes egregie a se conscriptas mascole descendit, demum de Potu aqua dietetico elegantem habuit Lectionem publicam. Tot documentis in doctrina & vita probatum, dignissimum judicavit Facultas Medica cui præmia laborum, & summi in Medicina Honores, publica promotione, more veterum, decerneretur; ac proinde veniam Doctoralia insignia, tam egregio artis Licentiatu conferendi ab Illustrissimo Academicæ nostræ Cancellario, Excellentissimo Comite, Domino CAROLO GILLENBORG, Regis Regniqve Sociæ Senatore & Regiæ Cancellariæ Præsidente submitte petiit. Qui pro eu, qua in bonas literas earumque cultores genuinos ineffabili est gratia, Celsissimus Heros, Votis nostris gratiosissime annuit.

Huic itaque actui Academico dies dictus est hujus mensis Aprilis XII. (proximus dies Martis, hora IX, in Auditorio Carolino Majori.

Ut vero huic inaugurationi interesse velint literarum Patroni, Fautores & Cultores, Patres Civesque Academici & Urbici, quo decet verborum honore, rogamus & obsecramus. P. Upsalæ die IX Aprilis MDCCXLIII.

Vc.

Venient annis Secula feris
quibus Oceanus vincula rerum
laxet, novosque typhis detegat orbes
atque ingens pateat Tellus
nec sit Terris ultima Tule.

Senec. in medeam.

ORATIO

Este hujus Universi stupendam machinam, infiniti Artificis manu productam & creatam, non divina modo Scriptura, verum etiam sana doctet ratio.

1. Nil enim existit sine causa, nec causarum secundarum progressum in infinitum quisquam sanæ mentis admittere potest; subsistendum ergo est extra illarum seriem in Causa prima, infinita, perfectissima.

2. Nil enim existit sine causa, nec causarum secundarum progressum in infinitum quisquam sanæ mentis admittere potest; subsistendum ergo est extra illarum seriem in Causa prima, infinita, perfectissima.

3. Contemplemus nosmet ipsos.

Consideremus omnia Animalia & Insecta.

Cogitemus Vegetabilia singula.

Ubique occurrit stupendum Artificium, nulla humana aut finita arte ullatenus imitandum.

Ne fibram quidem unicam, ex quarum infinitis fasciculis quodlibet horum corporum est coagmentatum, imitari valet ulla ars, ullum ingenium.

In minimo enim quovis filamento Digitus Dei & sigillum Artificis elucet.

Si *Elementorum* proprietates contemplationi submittantur, mox stupet & admirationi immergitur animus.

Si remotissima a nobis *Astra* oculo vel nudo vel armato subjecerimus, & eorum indolem, magnitudinem, & in infinito abyssu per horas & minuta determinatum cursum fuerimus contemplati, mox infiniti

Et 4

76. *Pluvie & Imbres* Semina abripiunt in terræ cavernas, rivos & flumina, & illa ab uberibus matris avulsa peregrino committunt solo.

77. *Color solaris & Cæli* serenitas faciunt ut pleraque Pericarpia aperiantur, & occasionem subministrant ventis, dum plantam concutiant & capsulas quasiant, latentia intus semina secum abripiendi.

78. Sed pluvia æris tempestas eo adigit plantas, ut claudant pericarpia, & ostia eorum quasi pessulo obducant, ne gutta aquæ feminibus intermixta illa conglutinent, & in ipsa planta germinare cogant.

Anasætica mira pollet naturâ. Dum enim maturere semina, rami ejus pugni adinstar contrahuntur & pericarpia comprimunt, ne temere dilapidentur semina, aut avibus in escam cedant. Creverit hæc planta in arenosis Maris Rubri littoribus, ubi aestu maris autumnali abripitur integra, & in profundum projicitur. Sed dum vere insequente mare purgamenta sua littoribus impingit, & hanc in arenam expulit, illius est indolis, ut frigida aqua non afficiatur, sed in tepida mox expandat ramos, & semina demittat. Hinc in littore constituta, ubi aqua tepescit, dilatatur, semina sua prostermit, quæ aqua defluente radices agunt, & integram ripam vestiunt.

79. *Siristura* etiam plantarum propagationi favet. *Medicago* pericarpia habet plane cochleæformia. *Salicornia* vero & *Salola* semina cochleis simillima; neque alibi quam in littoribus marinis sponte crescunt, quæ cochlearum testis sunt oblita. Hinc pisces & aves, feminibus & foliis in mare proci dentibus vescentes, procul dubio hæc semina transeunt, eas esse cochleas genuinas opinantes.

80. Jucundum est visu, quanta cura Numen certas plan-

plantas custodiverit, ne flores & fructus earum ab animalibus & avibus plane destruerentur: munivit enim eas ab omni parte *acutis* vel *spinis*.

Crescunt hæc plantæ ubertim in locis desertis, ab animalium injuria securæ: hinc Terra jam Carduorum & Spinarum est feracissima.

81. Ipsa *Semina* sæpe projectionem suam in longinquum adjuvare tenentur.

Crupina species est Centauræ, cujus semina prominentibus & erectis setis sunt instructa, quarum ope ita repunt, & se subducunt, ut vix ulla arte possint manu contineri. Si unum horum inter tibiale & pedem recondatur, sæpe prope collare vel manicam exitum quaerit, peragrato toto corpore.

Ita *Avena nuda*, si post messem cum reliquo frumento in horreo recondatur, ex glumis suis ipsa egreditur, neque plerumque antea subsistit, quam ad parietem horrei pervenerit. Hinc Dalecarlus, dum mature secuit avenam, fasciculos in horreum colligit, & post aliquot dies, omnes glumas vacuas, avenam seorsim invenit: est enim cuilibet femini avenaceo adjuncta arista cum spira, quæ convolvitur, & retorquetur, prout cælum est vel serenum vel nubilum. Hinc dum in gyrum vertitur spira, protrudit avenam, quæ non potest in priorem locum recidere, spira retrorsum voluta, obsetas laterales reditum impediens. Si fumantur

Equiseti aut *Filicis* semina, hæc in chartam projecta & microscopio visa, pedibus quasi, per minuta aliqua saltationes instituunt, quo saltu suo discedunt ab invicem & dissipantur: ita ut rei ignarus juraret, non esse hæc semina, sed acaros & insecta (g).

Modus mirandus, quo alia plantæ propagantur, conspicuus est in Arachide, Lathyro, Trifolio, Valantia.

Ff 4

82. Va.

(g) vide Stoecheini Obs. in Act. parif.

gidis repleta. Nisi ita provifum fuiffet a Creatore his feminibus, fed fi fupra terram cogerebantur maturefcere, mox rancida & inutilia redderentur, & vix poffent unquam cum fpe novi germinis terræ committi.

87. Eodem modo cum *Pinu* & *Abiete* fere comparatum eft. Harum oleofa femina ex minimo calore rancorem contrahunt & fertilitatem. Dum *Abies* in flore conftituta eft, ftant frobili ejus erecti & patuli: cum vero defloruerit, eos demittit, atque imbricatam eorum compagem comprimit, eo arctius, quo magis frigus urget proxima hyeme, quoniam aqua, ut in teftis tegulati operis cogatur defluere: fub initio Aprilis, dum Sol rediens calidos fpargit radios, aperiuntur denuo frobili, femina emittunt, quæ gremio terræ tepido exapta, & pluviis vernalibus humectata facile radices agunt. Quæ tamen tantum non omnia interirent, fi calori æftivali exponerentur.

88. Aliæ plantæ Semina habent, quæ ferius vel maturius germinant: aliæ diverfo tempore, per annum vel biennium in terra latent, antequam excrefcant. Tales funt Roſæ, Mefpili, Juniperi.

89. Dum in tenella ætate pueriliter ego ludebam in Patris mei horto, hortulum mihi conficiebam, cui inſevi plantas omnes, quarum copia mihi erat; inter alias vero Cardui ſpeciem alui, qui quotannis a Patre in herba eradicabatur, ne femina diffunderet. Nihilominus quovis anno novæ ejusdem ſpeciei plantæ prodibant. Nec dubito hodiernum aliquam femina hæſtenus latentia emergere in conſpectum. Inde didici cauſam, cur agri Carduis obnoxii difficulter poſſint purgari, quamvis enim aretur, occetur, & radices evellantur, exſurgunt tamen furculi Carduorum ex ſemel ſparſis feminibus poſt annum, biennium, triennium, immo decimum poſt decennium aut vicennium.

Ff 5

Hypecoon

A D H Æ R E N T E S §. 68.

Ca- Arctium.
lyce. Marrubium.

Neurada.

Agrimonia.

Rhexia.

Centauria.

Asperugo.

Rumex.

Urtica.

Parietaria.

Plumbago.

Linnæa.

Sigesbeckia.

Peri- Triumfetta.

car- Bartamia.

pio. Urena.

Heliocarpus.

Aparine.

Valantia.

Circæa.

Vella.

Calligonum.

Neurada

Glycyrrhiza.

Hedysarum.

Scorpiurus.

Hipocrepis.

Aelchynomene.

Petiveria.

Triglochin.

Cranololia.

Martynia.

Clypeola.

Xanthium.

Semi- Verbena.

ne. Blairia.

Cynogloſſum.

Myofotis.

Lappula.

Daucus.

Sanicula.

Caucalis.

Arctopus.

Bubon.

Ranunculus.

Avena.

Bidens.

Verbefina.

Boerhavia.

Geum.

E L A S T I C Æ. §. 67.

Car- Hura.

tila- Impatiens.

gine. Oxalis.

Mu- Juſticia.

cro- Lathræa.

ne. Ruellia.

Diof-

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ARCHIATR. REG. MEDIC. ET BOTAN. PROFESS.
VPSAL. ACAD. IMPERIAL. MONSIEUR. BEROL. TOLOS.
VPSAL. STOCKH. SOC. ET PARIS. CORRISP.

PHILOSOPHIA BOTANICA

IN QUÀ

EXPLICANTUR

FUNDAMENTA BOTANICÆ

CUM

DEFINITIONIBUS PARTIUM,
EXEMPLIS TERMINORUM,
OBSERVATIONIBUS RARIORUM,

ADJECTIS

FIGURIS ÆNEIS.

EDITIO ALTERA.



VIENNÆ AUSTRIÆ,

Typis JOANNIS THOMÆ TRATTNER, Cæl. Reg.
Aulæ Typographi & Bibliopolæ, MDCCCLXIII.

31]

76. LITHIOPHYTA olim relicta *Plutoni*, MARSILIUS
Floræ imperio subiecit, at PEYSONELLUS eadem
Familie Regno restituit.

Art. acad. sc. Ratio Peysonelli 1727. B. Juss. 1741.

77. METHODI NATURALIS Fragmenta studiose in-
quiritanda sunt.

Primum & ultimum hoc in Botanicis desideratum est.
Natura non facit saltus.

92]

133. Vegetabilia, sentiatione licet destituantur, æque ta-
men ac animalia vivere (3) probat *Ortus*, *Nutri-*
tio, *Ætas*, *Motus*, *Propulsio*, *Morbis*, *Mors*,
Anatomia, *Organismus*.

Ortus ex Semine vel Gemma.

Nutritio ex humo tenuissima *Kylbel* cum aqua & aëre. *Hales*,
Ætas: infantia, pueritia, adolescentia, virilitas, senectus;

Arbores, *Hedera*.

Motus: Horam diei observant flores *semisfosculosi* & varii alii.
Pluviam prælagit mane *Calendula*.

Noctu uocat. *Draba*, *Parthenium foliis ovatis crenatis*,
Trientalis.

flaccescit *Impatiens*, *Amorpha*:

reflectitur *Sigesbeckia*, *Triumfetta*:

clauduntur *Mimosa*, *Papilionaceæ*, *Lomentaceæ*.
componitur *Tamarindas*;

De die autem vigilant patentibus foliis.

Solem sequitur *Rafeda Luteola*, & flores *semisfosculosi*.
Defectus motus ex umbra aut sylva, hinc diversa

statura *Pini* aliorumque.

Propulsio, non enim datur in Plantis Circulatio.

Morbis: Aëlis, Sitis, Pernio, Fames, Polyfarchia, Cancer,
infecta.

Mori. Oppositum vitæ est.

Anatomia: Vasa, Utriculi, Tracheæ, Cutis, Epidermis.

Organismus: Vasa secretoria, Glandulæ.

94]

141. Flos (140) antecedit omnem fructum, ut *Gene-*
ratio partum.

Colchicum & *Hamamelis* autumnò florent, cujus fructum in se-
quenti anno produciunt.

Musæ fructus non præcedit flori, licet maximum sit Germen, &
non fecundatus cessat adulescere, non vero matu-
rescere.

146. CALYX ergo est *Thalamus*, **CORLLA** *Auleum*, **FILAMENTA** *Vasa Spermatica*; **ANTHERÆ** *Testes*, **POLLEN** *Genitura*, **STIGMA** *Vulva*, **STYLUS** *Vagina*, **GERMEN** *Ovarium*, **PERICARPIUM** *Ovarium fecundatum*, **SEMEN** *Ovum*.

Calyx posset pro *Cunni labiis* vel *Præputio* etiam haberi.
Corolla posset etiam loco *Nympharum sumi*.

Filamenta, quæ succum ad antheras deferunt. *vasa spermaticea* dicuntur.

Antheræ *Tijliculi* sunt.

Sigma *Vulva*, respondens parti illi, quæ in sexu sequiores *lympham genitalem* secernit.

Stylus *Vaginæ* vel *Tubæ Fallopiæ* respondet, licet huic minus proprie.

105

162. NATURÆ opus semper est *Species* (157) & *Genus* (159); **CULTURÆ** sæpius *Varietas* (158); **NATURÆ & ARTIS** *Classis* (160) & *Ordo* (161).

Species constantissimæ sunt, cum earum generatio est vera continuatio.

Genera esse naturalia evincunt plurimæ plantæ: *Aconita*, *Nigellæ*, *Bignoniæ*, *Ranunculi*, *Mesempryanthema*, *Zygophylla*, *Gerania*, *Oxalides*.

Varietates culturæ opus esse, docet *Horticultura*, quæ eandem sæpius & prouducit, & reducit.

Classes & *Ordines* plerasque naturales esse, docent *ordines naturales* §. 77.

163. HABITUS est conformitas quædam *Vegetabilium* affinium & congenerum, in *Placentatione*, *Radicatione*, *Ramificatione*, *Intorsione*, *Geminatione*, *Foliatione*, *Stipulatione*, *Pubescentia*, *Glandulatione*, *Lactescencia*, *Inflorescentia*, aliisque.

FACIES EXTERNA vulgo a Botanicis antea dictus est *Habitus*.

C. *Bauhinus* & *Veteres* egregie ex *Habitu* plantarum divinarunt earundem adfinitates, ut ipsi *Systematici* sæpius deflexerint, ubi *Habitus* recta duxerat.

Methodus naturalis est ultimus finis *Botanices* (§. 77).

Fructificatio, recentiorum inventum, viam primario aperuit ad *Methodum naturalem*, sed nec hæc etiamnum ita intelligitur, ut omnes *classes* detegat.

Habitus, uti in *Quadrupedibus* distinguit *Feras* a *Pecoribus*, quamvis *Dentes* non inspicerentur; sic etiam in *Plantis* sæpe harum *ordines naturales* primo intuitu manifestat.

121

168. Habitus (163) occulte consulendus est, ne *genus erroneum* lævi de causa fingatur.

Experientia rerum magistra, primo intuitu ex *facie externa*, *plantarum familias* sæpius divinat.

Exempla confirmant *regulam*:

Isopyrum, *Nigella*, *Helleborus*, *Caltha* diversa.

Sambucus & Ebulus; Trifolium & Triphyllolides conjugenda.

Primo intuitu distinguit sæpius exercitatus Botanicus plantas Africæ, Asiæ, Americæ Alpiumque, sed non facile diceret ipse, ex qua nota. Nescio, quæ facies tori,

122

Jicca, *obscura* *AFRIS*: quæ *superba*, *exaltata* *ASIATICIS*; quæ *læta*, *glabra* *AMERICANIS*; quæ *coarctata*, *indurata* *ALPIS*?

Occulte consulendus est habitus, ne intret cohortem notarum characterificarum & genera disterminet: Exemplis probatur *Boerhaavii Ind. Lugduno-Batavi*; cum nullus ex facie descripta homines singulos nosse studeret.

134

191. Naturalis Character (189) ab omni Botanico (7) teneatur oportet.

Si omnium generum characteres Essentiales detecti essent, facillime evaderet plantarum cognitio, & multi suo damno

Characteres Naturales flocci penderent; at sciant, nullum sine notitia characteristica naturali evasurum solidum Botanicum;

135

novis enim detectis generibus, desituto characteri naturali, Botanicus semper vacillabit. Qui credit se sapere in Botanicis ex Essentiali Characterere, neglecto Naturali, is itaque fallit & fallitur; cum essentialis, novis detectis generibus, nequit non sæpius fallax evadere.

Character naturalis generum plantarum fundamentum est, quo destitutus nullus de genere rite judicabit; adeoque absolutum fundamentum cognitionis plantarum est & erit.

192. Character Naturalis (189) fructificationis notas omnes differentes (98) & singulares (105), per singulas suas species (157) convenientes (165), recenset, dissentientes (166) vero fileat.

Est opus infiniti laboris, antequam Characteres, secundum omnes species fuerint limitati.

206. Classes quo magis naturales, eo, ceteris paribus, præstantiores sunt.

Adfines conveniunt habitu, nascendi modo, proprietatibus, viribus, usu.

Summorum Botanicorum hodiernus labor in his sudat, & desudare decet.

Methodus Naturalis hinc ultimus finis Botanices est & erit.
Obicem Methodi naturalis obicere tria præpomis obtaacula.

252. Nomina Classium & Ordinum e Viribus, Radice, Herba & Habitu petita, mala sunt.

Systematica vocabula debent esse essentialia ex fructificatione desumpta.

Fragmenta methodi Naturalis ab accidentalibus nomina desumere, utpote vicaria, quum absoluto systemate, necesse est, ut mutantur omnia ex lege futuri divisionis systematis.

Plantis dubii generis imposui semper erronea nomina, in Oides, vel aliter diminutiva, quum planta debuit in Catalogo numerari, neque adhuc constaret de fructificatione; adeoque impossibile erat etiamnum verum nomen; sic lectores a solo erroneo vocabulo moniti, ne de genere incerto inquirerent attentius in fructificationem.

Viribus.	Radice.	Folius.	Habitu.
Cordialis	Bulbosa	Asperifolia	Verticillata
Capillaris	Tuberosa	Succulenta	Stellata
	Fibrosa		Dorsifera.
	Arbores		
	Frutices		

EFFLORESCENTIA est tempus mentis: quo lingulae, cics plantarum primos Flores ostendunt. e. gr. 174. Uspalia.

APRILIS Fl. suec.

- | | |
|-----------------------|------------------------|
| 17. Hepatica 445. | 15. Draba 526. |
| 18. Fumaria 585. | 16. Leontodon 627. |
| 22. Tussilago 680. | 17. Saxifraga 350. |
| 23. Daphne 311. | Orobis 595. |
| 24. Pulmonaria 156. | 18. Adoxa 326. |
| 25. Draba 523. | Alchemilla 135. |
| 26. Ornithogalum 270. | 19. Chelidonium 430. |
| 27. Viola 716. | Fragaria 414. |
| 28. Pulsatilla 446. | Convallaria 274. |
| 29. Empetrum 832. | 20. Fritillaria 81. 1. |
| 30. Anemone 450. | Cynosurus 82. |

MAJI.

- | | |
|--------------------|----------------------|
| 1. Ranunculus 460. | 21. Asclepias 431. |
| 2. Tussilago 683. | Menyanthes 163. |
| 3. Lathraea 718. | Paris 325. |
| 4. Myrica 817. | 22. Primula 162. |
| 5. Viola 718. | 23. Convallaria 273. |
| 6. Primula 161. | Trientalis 302. |
| 7. Glechoma 483. | Orobis 596. |
| 8. Betula 776. | Loniceria 192. |
| 9. Caltha 473. | 24. Pyrus 130. 1. |
| 10. Oxalis 385. | Pyrus 130. 2. |
| 11. Vaccinium 313. | 25. Statice 253. |
| 12. Fraxinus 830. | Polygala 586. |
| 13. Viola 719. | Lotus 609. |
| 14. Androsace 160. | Trifolium 615. |
| | Ranunculus 469. |
| | Cherophyllum 243. |

MAJI.

- | |
|---------------------|
| 26. Triglochin 259. |
| 27. Pinus 788. |
| Juniperus 824. |
| 28. Potentilla 419. |
| Cynoglossum 154. |
| Hyoscyamus 15. |
| Erysimum 558. |
| 29. Berberis 290. |
| Syringa 6: 1. |
| 30. Ledum 341. |
| Vaccinium 312. |
| Asclepias 200. |
| Sorbus 400. |
| Geranium 571. |
| Dentaria 565. |
| Ranunculus 472. |

JUNII.

- | |
|-----------------|
| 1. Geum 423. |
| Gnaphalium 671. |
| Pyrola 334. |
| Thymus 477. |
| Potentilla 415. |
| Bryonia 790. |
| Nymphaea 426. |
| 2. Anchusa 153. |
| &c. &c. |

Cardui varii non florent antequam Solstitium absolutum est.
Parnassia fenestecii præco est.
Colchicum autumnali & gelu nuncia est.

VIGELIA plantarum absolventur determinatis horis diei, quibus plantæ flores quotidie aperiant, expandunt, & claudunt.

Solares Flores dicuntur, qui determinatum tempus se explicandi & claudendi observant; sunt hi triplices.
1. Meteorici flores solares, qui minus accurate observant horam explicationis, sed prius vel serius aperiantur pro ratione Umbræ, Aëris humidi vel siccl, Atmosphæræ pressione majori aut minori.

2. Propter mane aperiantur & ante vesperam recluduntur quotidie, sed hora explicationis ascendit vel descendit, uti dies adcrevit aut decrevit; adeoque observant horas Turcicas s. inæquales.
3. Aequinoctiales flores aperiantur certa & positiva diei hora, & plerumque etiam determinata hora quotidie recluduntur. Observant hi horas Europæas s. æquales.

Calendula africana Hort. upf. 274. n. 2. vigilias subit inter horam sextam & septimam matutinam, vigilans in horam pomeridianam quartam, si tempestas diei fuerit sicca, at vero si vigilias non adsumat, seu non aperiat flores hora septima matutina, pluvia hoc die cadent, constanti lege; imbres autem ex contritu evitare non facile discit. Senecus jibricus h noctu claudatur, proxima dies plerumque fera erit, si vero aperto flore per noctem vigilet, insequens dies plerumque erit pluviosa.

Calendaria flore quotannis conficienda sunt in quavis Provincia, secundum Frondescentiam, Efflorescentiam, Fructescientiam, Defoliationem, observato simul Climate, ut inde constet diversitas Regionum inter se.
Horologia Flora sub quovis climate elaboranda sunt secundum Vigilias plantarum, ut quivis sine horologio aut sole, horam diei enumeratam habeat.

Vernales sunt Alpine omnes, cum in Alpibus hyems excipiat ver, vix gustata æstate, adeoque citissime florescant & fructescant.

HISTORY

OF THE

MISSION

OF THE

UNITED BRETHREN

AMONG THE

Indians in North America.

IN THREE PARTS.

BY

GEORGE HENRY LOSKIEL.

TRANSLATED FROM THE GERMAN

BY CHRISTIAN IGNATIUS LA TROBE.

LONDON:

PRINTED FOR THE BRETHREN'S SOCIETY FOR THE
FURTHERANCE OF THE GOSPEL:

SOLD AT No. 10, NEVIL'S COURT, FETTER LANE;

AND BY JOHN STOCKDALE, OPPOSITE BURLINGTON HOUSE,
PICCADILLY.

1794.



80 West from London

Longitude East from Philadelphia

of life. They shot upwards of one hundred and fifty deer during the course of the journey, and found great abundance of fish in the rivers and brooks. They likewise met with

a peculiar kind of turtle, about the size of a goose, with a long neck, pointed head, and eyes like a dove. It had scales on its back, and on the lower part of the belly. All the rest of its covering was soft, resembling leather of a liver color.

July 29th, they left the mountains and arrived on the banks the Ohio, where they immediately built canoes, to fend the aged and infirm with the heavy baggage down the river. Two days after they were met by Brother Heckenwacker and some Indian Brethren with horses from Friedenschadt, by whose assistance they arrived there on the 5th of August, and were received with every mark of affection by the whole congregation. They now joined in praising and thanking the Lord for the grace and protection, received from him during this tedious journey of eight weeks, for having supported them under the unusual fatigue and hardships attending it, for giving them health and strength to bear many grievous trials, and for preserving them from famine, which they feared most at setting out, and from innumerable dangers and unforeseen accidents, and chiefly for granting them to continue in love and peace.

The preservation of the Indian congregation by God our Heavenly Father, was at this time most admirably displayed, and the missionaries acknowledged with humility and gratitude, that neither the inhabitants of Friedenschadt nor their numerous guests lacked any thing, but, contrary to the apprehensions of a great many, had enough and to spare.

The travellers received likewise a present of one hundred Spanish dollars from the friends, commonly called Quakers in Philadelphia, with which they provided a supply of bread for future necessity.

Soon after their arrival in Friedenschadt, Brother Zeisberger came from Schoenbrunn, and several conferences were held concerning the mission in general. The missionaries and their Indian assistants were also employed in revising all the

translations of different parts of the Scriptures and hymns made in the Delaware language. A conference of Indian assistants was likewise appointed for each settlement.

August 19th, the Brethren Ettwein, Zeisberger, and Heckenwacker went to Schoenbrunn, where they arrived on the 23d. The former, in his report, expressed great pleasure in seeing a country so pleasing in every point of view, and so richly provided with walnut and locust trees; but still more in beholding the new settlement Schoenbrunn, begun under such favorable and promising circumstances. Brother Zeisberger being taken ill, Brother Ettwein went with the deputies, appointed by the Indian Brethren, to Gekelemukpechenk, to procure renewed assurances of protection from the council. The inhabitants of this place had just received seventy gallons of rum, and were engaged in a drunken frolic, when the news of the arrival of the missionary and the deputies came to the Chief. He immediately gave orders to desist, and after they had regained their sobriety by a sound sleep, called a council, in which the deputies mentioned the arrival of the two congregations of Friedenschuetten and Tschetschequanink in the usual solemn manner; informing them that they intended to build one or perhaps two settlements besides Schoenbrunn. The speaker of the embassy, John Papunhank, took this opportunity, to give the council a full explanation of the sentiments, constitution, doctrine, and worship of the converted Indians. He did this in a solemn and manly style, relating how he had lived formerly, and how God had shown mercy to him. The answer was kind, and a promise given that in return an embassy should be sent to Schoenbrunn.

At Schoenbrunn the Brethren Ettwein and Zeisberger greatly rejoiced at the marvellous dispensation of God our Savior, who had thus placed his Indian flock as a candle upon a candlestick in the midst of the Delaware country, and in the neighborhood of the Shawanose and Hurons. Brother Ettwein then returned to Bethlehem, by way of Friedenschadt, with the most pleasing prospects for futurity.

ARBORETUM ET FRUTICETUM BRITANNICUM;

OR,

THE TREES AND SHRUBS OF BRITAIN,
— *Native and Foreign, Hardy and Half-Hardy,*
PICTORIALLY AND BOTANICALLY DELINEATED,
AND SCIENTIFICALLY AND POPULARLY DESCRIBED;

WITH

THEIR PROPAGATION, CULTURE, MANAGEMENT,
AND USES IN THE ARTS, IN USEFUL AND ORNAMENTAL PLANTATIONS, AND IN
LANDSCAPE-GARDENING;

PRECEDED BY A HISTORICAL AND GEOGRAPHICAL OUTLINE
OF THE TREES AND SHRUBS OF TEMPERATE CLIMATES
THROUGHOUT THE WORLD.

BY J. C. LOUDON, F.L. & H.S. &c.

AUTHOR OF THE ENCYCLOPÆDIA OF GARDENING AND OF AGRICULTURE.

IN EIGHT VOLUMES:

FOUR OF LETTERPRESS, ILLUSTRATED BY ABOVE 2500 ENGRAVINGS;
AND FOUR OF OCTAVO AND QUARTO PLATES.

VOL. I.

HISTORY, GEOGRAPHY, AND SCIENCE; AND DESCRIPTIONS, FROM
RANUNCULACEÆ TO STAPHYLEACEÆ, P. 494., INCLUSIVE.

SECOND EDITION.

LONDON:
PRINTED FOR THE AUTHOR;

AND SOLD BY
PATERNOSTER-ROW.

LONGMAN, BROWN, GREEN, AND LONGMANS,

1844.

In estimating the heights of these trees and shrubs, we have supposed them to be growing in their natural and ordinary habitats. Under culture, or even in a wild state under favourable circumstances, many of them would grow higher, particularly the roses, the willows, and the fruticose plants. The number of the latter might have been increased, by adding the carnation, the pink, &c., which, even as indigenous plants, are certainly as much fruticose as *Euphorbia Characiæ*, or *E. amygdaloides*.

The above enumeration includes 71 genera, and about 200 species, nearly 100 of which are willows, roses, and brambles; and these species are comprised in 37 groups or natural orders. In greater detail, they are:—

- 27 deciduous trees, from 30 ft. to 60 ft. in height.
- 28 deciduous trees, from 15 ft. to 30 ft. in height.
- 1 evergreen tree, from 60 ft. to 80 ft., the Scotch pine.

CHAP. II.

BRITISH ISLANDS.

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3 evergreen trees, from 15 ft. to 30 ft., the box, the yew, and the holly.

65 deciduous shrubs, and very low trees, from 5 ft. to 18 ft.; including 21 roses and 32 willows.

26 deciduous shrubs, from 1 ft. to 5 ft.; including 6 roses and 10 willows.

5 evergreen shrubs, from 5 ft. to 15 ft.

7 evergreen shrubs, from 1 ft. to 5 ft.

1 evergreen climber, the ivy.

1 deciduous climber, the clematis.

2 deciduous twiners, honeysuckles.

8 evergreen trailers, brambles.

3 deciduous trailers; the *Rosa arvensis*, the *Solanum Dulcamara*, and the *Rubus cæsius*.

13 evergreen shrubs, or fruticose plants, from 6 in. to, 1 ft. in height; such as the *Vaccinium Vitis idæa*, the ericas, *Andrœmeda polifolia*, &c.

10 deciduous shrubs, or fruticose plants, from 3 in. to 1 ft. in height; such as *Cornus palustris*, *Vaccinium Myrtillus*, *Salix reticulata*, *prostrata*, &c.

SECT. II. Of the Foreign Trees and Shrubs introduced into the British Isles.

Europe: Greece, Turkey in Europe, and the Levant, 36; Italy, 35; Sicily and other Mediterranean islands, 19; Spain, 69; Portugal, 12; Switzerland, 49; France, 34; Germany, 52; Hungary, 46; Russia, 41; Sweden, 4; Lapland, 4; Spitzbergen, 1; North of Europe, 2; Central Europe, 18; South of Europe, 111; in all, 543. *Asia*: Siberia, 69; Asia Minor, 3; East Indies, 4; Nepal, 54; China, 34; Japan, 11; Persia, 5; Asia, 3; in all, 183. *Africa and the Canary Isles*: Barbary States, 13; Egypt, 3; Cape of Good Hope, 4; Canary Isles, 3; in all, 23. *America*: North America, 528; Mexico, 4; South America, 22; Straits of Magellan, 6; in all, 560. *Australia and Polynesia*: New Holland, 1; Van Diemen's Land, 2; New Zealand, 1; in all, 4.

It would thus appear, that nearly half the foreign trees and shrubs in the country have been introduced during the present century; and that these have been brought chiefly from North America. Among them there are not more than 300 trees which attain a timber-like size, and of these by far the most valuable is the larch. Some of the European acers, the sweet chestnut, some oaks, some poplars, pines, and firs, and the planatus and cedar from Asia, are also valuable as timber trees; but the chief accessions to this class are the acers, oaks, elms, ashes, poplars, birches, pines, and firs of North America. Our principal fruit trees are from Asia, including the common walnut, which is both a fruit and a timber tree; but by far the finest

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ornamental trees and shrubs are from North America. Our greatest hopes for future introductions are from the unpenetrated regions of North America, and the mountainous regions of Asia and New Zealand.

We shall conclude this chapter by enumerating some of the principal planters of arboretums, and places where arboretums were planted, during the present century; premising that we do not include in this list any of those places which were commenced during the last century.

Among the planters of arboretums in Great Britain during the nineteenth century, the first place belongs to George, fourth duke of Marlborough. This nobleman, when Marquess of Blandford, resided on the estate of White Knights, near Reading, from the year 1800 till he succeeded his father in 1817.

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André Michaux was born in the Park of Versailles, in 1746, and soon evinced a taste for agriculture and botany, which was fostered by his early patron, the court physician, M. Lemoignon. In 1777 he studied botany under Bernard de Jussieu, at Trianon; and in 1779 he was studying in the *Jardin des Plantes*. Soon after this he came to England, and

If wild plants are said to follow those animals to which they supply food, cultivated plants are the followers of man in a state of civilisation. In all cases of taking possession of a new country, the first step of the settlers has been to introduce those vegetables which, in their own country, they knew to be the most productive of human food; because the natural resource of man for subsistence is the ground. In all temperate climates, the plants of necessity may be considered to be the cereal grasses and the edible roots. Trees, with the exception of such as bear edible fruit, are not introduced till a considerable period afterwards; because all new and uncivilised countries abound in forests of timber. It can only be when this timber becomes scarce, or when wealth and taste have increased to such an extent as to create a desire for new trees as objects of curiosity, that the practice takes place of cultivating indigenous trees, or of introducing new ones. Hence we find that, in England, all the timber required for the purposes of construction and fuel was obtained from the native forests and copses, till about the time of Henry VIII. In this reign and the next, Holinshed informs us that plantations of trees began to be made for purposes of utility; and we find, in the same reign, that attention began to be paid to the trees and shrubs of foreign countries,

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There were introduced from the year	There were introduced from the year	Species.	Species.
to the year	to the year	1691	1700
1349	1691	17	24
1551	1700	1	12
1561	1711	18	12
1570	1721	3	44
1580	1731	2	69
1591	1741	48	21
1599	1751	1	77
1601	1761	1	58
1610	1771	1	58
1620	1781	22	49
1630	1791	27	45
1640	1801	4	93
1650	1811	17	364
1660	1821	7	242
1670	1830	1	
1680			
1690		27	

The numbers, taken by centuries, are, in the 16th century, 89; in the 17th, 131; in the 18th, 445; and, in the first three decades of the 19th, 699! The total number of foreign trees and shrubs introduced up to the year 1830, appears to be about 1300; or, probably, up to the present moment, including all those species which have not yet flowered, and, consequently, have not yet been recorded in books, about 1400.

The countries from which these 1300 species have been introduced appear, from the *Hortus Britannicus*, to be as under: —

returned to France with a great number of trees, which were planted in the gardens of M. Lemonnier, and of the Maréchal de Noailles, where they succeeded perfectly. He often used to take from these gardens a packet of grafts, and, going through the woods of Versailles, he would graft them on the trees already there. In 1780, he went to botanise on the mountains of Auvergne with several botanists, among whom were Lamarck and Thouin. Michaux was the most active of all of them; besides his musket, haversack, portfolio, and several specimen boxes, he carried in his pocket seeds of the cedar of Lebanon, which he sowed in favourable situations. Soon afterwards he went to the Pyrenees and travelled in Spain; and, in a short time, accompanied the nephew of the celebrated Rousseau to Persia, the latter being appointed consul to that country in 1782. He went to Aleppo, Bagdad, the Tigris, the Euphrates, Bassora, and many other places, sending home numerous seeds to Thouin, Malesherbes, and others. Persia at that time was a prey to civil wars, and Michaux, plundered of every thing by the Arabs, was supplied with the means of continuing his journey by M. de la Touche, the English consul at Bassora, though France and England were at that time at war; M. de la Touche, his biographer observes, thinking that a naturalist, who travelled for the good of humanity, ought to be protected by every nation. In this part of the world Michaux remained two years, traversing mountains and deserts from the Indian to the Caspian Sea, and proving that the provinces situated between 33° and 43° of latitude in the East have supplied most of our trees, exclusive of those which belong to America. He here verified the fact first noticed by Kämpfer, that the male flowers of the date will keep during the year, and yet impregnate the female. (He sent home sculptured ruins from the palace known as that of Semiramis, near the Tigris, and various other antiques, and objects of natural history. He returned to Paris in June, 1785, and was chosen soon after to go to the United States, to collect seeds of trees and shrubs; to establish an entrepôt for them in the neighbourhood of New York; and to get them sent from that to Rambouillet, which was destined to receive them. He was also commissioned to send home American game. He arrived at New York in October, 1785; established a garden there; traversed New Jersey, Pennsylvania, and Maryland; and, after the first year, he sent home twelve boxes of seeds, and 5000 young trees, together with some Canadian partridges, which afterwards bred at Versailles. In September, 1789, he went to Carolina, making Charleston his dépôt; he traversed the Alleghany Mountains, and the whole country north and south, leaving his son at Charleston, in charge of the gardens there. From this place he sent home numerous seeds, and many hundreds of young trees. In April following, he set out to reconnoitre the sources of the Savannah; and there he discovered Magnolia auriculata, Robinia viscosa, Azalea n. coccinea, a Kalmia, a Rhododendron, and many oaks and other trees not before known. The manner in which he travelled, his intercourse with the native Indians, and the accidents he met with, are extremely interesting. Whenever he discovered a new plant, it inspired him with such enthusiasm, that he no longer felt fatigue. The discovery of a new Pavia, and of the Pinckneya pubens, gave him great pleasure. He arrived at New Providence in February, 1799, and returned to Charleston in May of the same year. He afterwards visited the highest mountains of Carolina. The dangers he experienced there convinced him of the necessity of having two guides, because one might perish by the road by a thousand accidents, and it would be impossible for a European to find his way alone through the country. He found in these mountains vast tracts covered with rhododendrons, kalmias, and azaleas, and with forests of trees altogether impenetrable. War, at this time, was declared between France and England; and Michaux was afraid of being forced to leave America. He had been for a long time occupied with the idea of determining the native place of all the American trees; and also at what latitude they began to grow rare, and where they disappear entirely:

No nursery in America is superior to Bartram's for fine specimens of trees. The dimensions of some of these, with those of many others, of which accounts have been sent us, will be given when treating of each particular tree in the third part of this work. (See also *Gard. Mag.*, vol. viii. p. 272.)

Part of the United States, and the Canadas, were visited by two excellent arboricultural observers; Mr. Robert Brown, formerly a nurseryman at Perth, and Mr. James Macnab, the son of the curator of the Edinburgh Botanic Garden, in the autumn of the year 1834; and an interesting notice of the distribution of different species of trees in the countries they passed through has been published in the *Quarterly Journal of Agriculture*, vol. v. p. 594, and will be found also in the twelfth volume of the *Gardener's Magazine*. Before landing at New York, the country appears to the stranger of a very dark and dismal hue, from the quantity of pines and red cedars which clothe the more conspicuous prominences; but, after landing, the whole, from the prevalence of fine trees and shrubs, appears like one vast garden. The stranger is strongly impressed with the beauty and number of trees, which are partly indigenous to the locality or the district, and partly introduced from more southern climates. The diversity of the forms of the trees, and the variety of their foliage, are most remarkable. No remains of ancient forests are observable, as might be supposed, these having been long since cut down for fuel; but forest trees of large size are frequently to be seen, covered to their summits with wild vines. Of these the *Platanus occidentalis*, *liriodendron*, *liquidambar*, *Gleditsia triacanthos*, and the catalpa are preeminent. It is worthy of remark, that almost the only foreign trees conspicuous in the artificial scenery of America are, various kinds of fruit trees, the Lombardy poplar, and the weeping willow. The contrast between the regular position and round-tufted heads of the fruit trees and the lance-shaped heads of the poplars, and between both these trees and the wild luxuriance of the indigenous species, is very striking.

IN EIGHT VOLUMES:

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FROM CELASTRA CÆÆ, P. 495., TO APOCYNACEÆ, P. 1256., INCLUSIVE.

SECOND EDITION.

LONDON:

PRINTED FOR THE AUTHOR:

AND SOLD BY

LONGMAN, BROWN, GREEN, AND LONGMANS,
PATERNOSTER-ROW.

1844.

ARBORETUM ET FRUTICETUM BRITANNICUM;

CHAP. XLII. LEGUMINACEÆ. ROBINIA.

The locust, though it may be grown as copse-wood, for being cut over every 5 or more years, or in a close wood, for being cut down or rooted up, at the end of 30 or 40 years, for its timber, can never be grown for undergrowth under any circumstances, for it will not endure the shade and drip of other trees. As an ornamental tree, it well deserves a place in every park, lawn, or shrubbery; but not in any quantity, because it is not calculated to produce effect in masses, but rather singly, in rows, or in small groups.

Poetical and Legendary Allusions. Perhaps no tree possesses more materials for poetry than the locust, and yet has been less noticed by poets. The poetical ideas connected with it arise from its being, when planted in shrubberies, the favourite resort of the nightingale, which probably chooses it for building its nest from an instinctive feeling of the protection afforded by its thorns. (*Syl. Flor.*, vol. i. p. 40.) In its native country, we are told that the American Indians make a declaration of love, by presenting a branch of the locust tree in blossom to the object of their attachment. (*Le Langage des Fleurs*, p. 114.) This tree is less injurious than any other to plants growing under its drip, from a singularity in the habit of its pinnated leaves; the leaflets of which fold over each other in wet weather, leaving the tree apparently stripped of half its foliage. The leaflets also fold up at night; and Philips mentions an instance of a child, who had observed this peculiarity in the tree, saying that "it was not bed-time, for the acacia tree had not begun its prayers." (*Syl. Flor.*, vol. i. p. 47.)

Soil and Situation. A sandy loam, rich rather than poor, is generally allowed to be the best soil for the robinia. Lord King truly observes that it requires a good garden soil to attain any size; though Mr. Blackie of Holkham says that there are innumerable locust trees growing at Holkham, upon "inferior sandy soils, where other forest trees barely exist." He adds, however, "They, no doubt, thrive best upon good land, and so do other trees; but they are inestimable in the quality of thriving where other trees will not grow." (*Withers's Treatise*, p. 283. and 233.) Their quality of thriving on poor soils is, no doubt, owing to their power of rapidly abstracting whatever nourishment such soils may contain, by their running roots; but, for the same reason, on such soils, they would soon become stunted, and good for little as timber trees. The only trees that will thrive, and ultimately become timber, on poor shallow soils, are the resiniferous needle-leaved kinds; such as the pine, the fir, the cedar, and the larch. In rich soils, the plants will produce shoots 6 ft. or 8 ft. long, for several years after planting; while in wet or poor soils they will not produce shoots above a fourth of that length. The situation ought to be at once airy and sheltered; as the tree is not fitted for being employed in exposed places, or as a screen for protection against wind. In general, it looks best planted singly on a lawn, or in small groups in a shrubbery, or on the margin of a plantation, where it is allowed to spread out its branches freely on every side, and to assume its own peculiar shape; feathering, as Gilpin says, to the ground.

The propagation of the shrubby, or raspberry-like, species of *Rubus* is effected by suckers or seeds; that of the bramble division of the genus by pegging down the points of the shoots to the soil, when they will root, and throw out other shoots, which may again be pegged down; so that plants are procured from brambles much in the same way as from strawberries.

Most of the raspberry kinds, and a few of the ornamental brambles, are procurable, in British nurseries, at 1s. 6d. a plant; at Bollwyller, for from 1 franc to 1½ francs; and, at New York, for from 37½ cents to 50 cents. The fruit-bearing raspberries, in the London nurseries, at 4d. each.

§ i. Leaves pinnate, of 3—7 leaflets.

1. *R. SUBERECTUS* Anders. The sub-erect Bramble.

Identification. Anders. in Linn. Soc.; Dec. Prod., 2. p. 556; Don's Mill, 2. p. 580; Smith Eng. Flora, 2. p. 406.

Synonymes. Lindley, in his *Syn. of the Brit. Flora*, has given the following: — *R. nesciensis* Hall; *R. plicatus* W. & N., not of Suppl. to Eng. Bot., t. 2714, which is a smaller form of *R. affinis* W. & N.; *R. corylifolius* Wahlb.

Engravings. Eng. Bot., t. 2572; E. of Gard., 1835, fig. 496.

Spec. Char., &c. Stem erect. Leaf of never more than 5 leaflets, digitate, occasionally pinnate, thin, shining, and plaited. Flowers in simple corymbose racemes. Prickles weak. Is found in Britain, in moist woods, and by the sides of rivulets, chiefly in the northern counties. (*Lindley, Synops. of the Brit. Flora*, ed. 2. p. 92.) This is "the most frequent species, if species it be, in the upland zone." (*Watson, in Oul. Geog. Distr.*, p. 137.) The stems are biennial, and flower the second year, like those of the common raspberry, afterwards dying off. They grow nearly upright, without any support, and are between 3 ft. and 4 ft. high. The fruit consists of rather a small number of dark red, or blood-coloured, aggregate grains, said to be agreeably acid, with some flavour of the raspberry; whence it has been recommended by some as perhaps not unworthy of cultivation.

2. *R. APRINIS* Weihe & Nees. The related Bramble.

Identification. Weihe and Nees's *Rubi Germanici*, p. 92. t. 3. and 36; Dec. Prod., 2. p. 580; Lindl. Synops. Br. Fl., 3d. ed. p. 92, 88.

Synonymes. Lindley, in his *Synops. Br. Fl.*, ed. 1.; *R. collinus* Dec.; *R. nitidus* Smith in Eng. Flor., *Lindley in Synops. Br. Fl.*, ed. 1.; *R. plicatus* Bortier in Eng. Bot. Suppl., t. 2714.

Engravings. Weihe and Nees's *R. G.*, t. 3. and 36; Eng. Bot. Suppl., t. 2714.

Spec. Char., &c. Stem arched, angled, prickly with strong recurved prickles, glabrous. Leaflets 3—5 in a pair, ovate with a thin, shining, and base cuspidate, sharply serrated, flat at the base, a little waved towards the tip, having downy tomentum beneath. Flowers in a compound panicle, the blackish calyx being at the base. Sepals ovate-acuminate, externally naked, reflexed. Carpels large, blackish. (*Dec. Prod.*, 2. p. 580.) A native of Germany, also of barren hills of Montpelier, and of Britain, in boggy places; and flowers in July and August. (*Lindley, Synops. Br. Fl.*)

Variety. *R. a. 2 bracteatus* Ser., *R. a. 7*, and *3*, Weihe and Nees's *Rubi Germ.*, t. 3. h. — Bractæas very broad, undivided.

3. *R. FISSUS* Lindl. The cleft Bramble.

Identification. Lindl. Synops. Br. Flora, ed. 2. p. 92.

Synonymes. *R. fassigatus* Lindl. in his *Synops. Br. Fl.*, ed. 1., not of Weihe & Nees.

Spec. Char., &c. Stem arched. Leaves digitate, shining, frequently of 7 leaflets, that are much less membranous than those of *R. suberectus*. Flowers in simple racemes. Prickles strong, numerous. It differs from *R. affinis* W. & N. in its small leaves never being large and broad, and they are in its inflorescence. The only specimen which I have seen, and which I doubtless is, is that of the garden of the Horticultural Society from Ayrshire." (*Lindley, Synops. Br. Fl.*, ed. 2. p. 93.)

4. *R. MICRANTHUS* D. Don. The small-flowered Bramble.

Identification. Don Prod. Fl. Nepal, p. 935; Dec. Prod., 2. p. 557; Don's Mill, 2. p. 580.

Synonymes. *R. pauciflorus* Lindl. in his *Synops. Br. Fl.*, ed. 1., p. 1530. *R. pauciflorus* Lindl.; and our fig. 449, representing a sprig to the usual scale, and figs. 450, and 450 a representing the flowers and fruit of the natural size.

9. *R. IDEUS* L. The Mount Ida Bramble, or common Raspberry.

Identification. Lin. Sp., 706; Dec. Prod., 2. p. 558.

Synonymes. *R. frambosensis* Lam. Fl. Fr., 3. p. 135; Framboisier, Fr.; gemeine Brombeere, Ger. "The Raspis is called in Greece BARTOS IDAIA; in Latin, *Rubus Idæa*, of the mountain Ida, on which it groweth; in English, Raspis, Framboise, and Hinde-berry." (*Johns. Ger.* p. 1274.) *Engravings.* Eng. Bot., t. 2492; and our fig. 452.

Spec. Char., &c. Villose. Stem round, bearing slender recurved prickles. Leaves pinnate; those of the fertile stems of 3 leaflets, those of the sterile stems of 5, rather palmately disposed. Leaflets ovate, incisedly serrated, whitely tomentose beneath. Stipules very narrow and bristle-like. Flowers in a corymbose panicle. Sepals ovate-lanceolate, whitely tomentose, ending in a point. Petals obovate-wedge-shaped, entire, conniving, shorter than the calyx. Carpels numerous, tomentose. (*Dec. Prod.*, ii. p. 558.) A shrub, with biennial stems, a native of Europe, and, probably, of Asia, Africa, and America.

Varieties. There are varieties with red fruit, yellow fruit, and white fruit. (*Dec. Prod.*, ii. p. 558.) There is a variety which bears twice in the year.

* *R. i. 2 microphyllus* Wallr. Sched., p. 256. — Leaves all of 3 leaflets. Stem suffrutescent; dwarfier and more bushy than the species. (*Dec. Prod.*, ii. p. 558.)

Description, &c. The common raspberry has a creeping root, with biennial stems, 3 ft. or 4 ft. high, pinnate leaves, and small white flowers. The fruit of the species, in a wild state, is crimson, and consists of numerous juicy grains, beset with the permanent styles; and highly fragrant, with a very deliciously sweet, and yet slightly acid, flavour, when eaten. It is a native of Europe, from Norway and Sweden to Spain and Greece, in woods. It is found in Asia, on the Himalaya Mountains, and in other places; in the north of Africa; and, according to Pursh, in America, in hedgerows, from Canada to Pennsylvania, though it has been probably introduced into that country. It is found in every part of Great Britain, and in Ireland, in the agricultural and subalpine regions, in woods, and in moist wastes. Improved varieties of it have long been in cultivation in gardens, for the fruit, which is delightfully fragrant, and grateful to the palate in itself, and is used in numerous culinary and confectionary articles, as well as in liqueurs. In France, raspberries are very generally eaten at table, mixed with strawberries. A very refreshing summer drink is made of them, by simply bruising them in water, and adding sugar. They enter into the composition of different jellies, jams, ices, syrups, and ratafias;



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and they are preserved, either alone, or along with currants. Infused in spirit, they communicate a most delicious perfume to it. Fermented, either alone, or mixed with currants or cherries, they make a very strong and agreeable wine; from which a very powerful spirit can be distilled. Raspberry wine was formerly much in use in Poland; the fruit being there abundant in the woods. In Russia, a mixture of raspberries and honey with water, fermented, makes a delicious hydromel. Raspberries are also dried in ovens for winter use. Raspberry vinegar is well known both in France and England; and, independently of its agreeableness when mixed with water, as a summer drink, it is excellent as a febrifuge.

§ ii. *Leaves digitate, of 3—5 leaflets.*

* 10. *R. LACINIA'TUS* W. The cut-leaved Bramble.

Identification. Willd. Hort. Berol., p. 82 and t. 82; *Dec. Prod.*, 2. p. 558; Don's Mill., 2. p. 552. *Engravings.* Willd. Hort. Berol., t. 82; Wata. Dend. Brit., t. 69; and our fig. 453.

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Spec. Char., &c. Stem rather round, bearing stout recurved prickles, compressed at the base. Leaflets 3—5, pinnately cut, sharply serrate, a little downy beneath. Flowers in loose panicles, white or rose-coloured. Sepals lanceolate, leafy at the tip, tomentose, prickled, reflexed. Petals wedge-shaped, 3-lobed at the tip. Carpels, roundish, dark coloured. (*Dec. Prod.*, ii. p. 558.) The appearance of this plant is that of the common bramble, except in the leaflets, which, from their being deeply cut, are strikingly different. Where it was first found is unknown; but it is, in all probability, only a variety of the common bramble, analogous to the cut-leaved variety of the elder (*Sambucus nigra laciniata*). Plants may be obtained at the principal nurseries.

* 11. *R. cæsius* L. The grey Bramble, or Dewberry.

Identification. Lin. Sp., 706; *Dec. Prod.*, 2. p. 558; Don's Mill., 2. p. 553. *Engravings.* N. Du Ham., 5. t. 22; Hayne Abolida., t. 160; Eng. Bot., t. 836; and our fig. 454.

Spec. Char., &c. Stem trailing, round, in many instances suffused with a grey bloom, bearing slender and a little recurved prickles. Leaflets 3 in a leaf, ovate, doubly serrated or crenated, glabrous, or obscurely ciliated. Panicle almost simple. Sepals ovate-acuminate. Petals white. Fruit sweet. Carpels large, few, greyish. (*Dec. Prod.*, ii. p. 558.)

Varieties.

* *R. c. 2 arvensis* Wallr. Sched., p. 288; *R. pseudo-cæsius* W'chse, according to Ern. Meyer in Litt. — Leaflets tomentose beneath. Branches puberulous.

* *R. c. 3 grandiflorus* Ser. — Pubescent. Petals and sepals long.

* *R. c. 4 parvifolius* Wallr. Sched., p. 228; and our fig. 455. — Stem ascending, purplish, ultimately naked. Leaves small, incisedly lobed. Peduncle 1—3-flowered. A native of herbage-covered hills.

* *R. c. 5 foliis variegatis* Hort. has variegated leaves.

Description, &c. A low, weakly, straggling, prostrate plant, having the flowers with bluish-coloured petals, and the fruit small, with few grains; but these large, juicy, black, with a fine glaucous bloom, and very agreeable acid. It is a native of Europe, and the north-east of Asia, in woods and hedges. By some it has been proposed to be cultivated on account of its fruit. (See *Encyc. of Gard.*, ed. 1835, p. 946.) This species, or race, varies exceedingly in different situations; whence have arisen the following varieties (12—16.), of more marked character than those already given, and which are considered by some as species; in which form they are as follows: —



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* 12. *R. HIRTUS* W. & K. The hairy Bramble.

Identification. Waldest. and Kit. Plant. Bar. Hung., 2 p. 130. t. 141.; Don's Mill, 2 p. 533.
Synonymes. *R. villosus* Ad., var. *glandulosus* Ser. in Dec. Prod., 2 p. 563.; *R. glandulosus* Benth. Arg. Engraving. Waldest. and Kit. Plant. Bar. Hung., 2 p. 150. t. 141.

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* 13. *R. SPRENGELII* Weihe. Sprengel's Bramble.

Identification. Weihe, according to Link Enum., 2 p. 62., and Spreng. Syst., 3. p. 528.; Don's Mill, 2 p. 533.
Synonymes. *R. vulpinus* Desf. Cat. Hort. Par., p. 205.; *R. villosus* β vulpinus Ser. in Dec. Prod., 2 p. 564.
Engraving. OEd. Fl. Dan., t. 1165.

Spec. Char., &c. This, as compared with *R. hirtus* Willd., & Kit. has its stem, petiole, and peduncle very finely villous, and only very slightly hispid with glanded hairs. Leaves rather glabrous. (Dec. Prod., ii. p. 564.) This, according to our Hort. Brit., is a native of Germany, and was introduced into Britain in 1833; it has pink flowers.

* 14. *R. DUMETORUM* Weihe & Nees. The Bramble of the Thickets.

Identification. Weihe and Nees, on the authority of Lindley's Synopsis of the Brit. Flora, ed. 2. p. 94.; Hort. Brit., No. 28336.; Don's Mill, 2 p. 533.
Spec. Char., &c. Branches with scarcely any bristles. Stem leaves with 5 leaflets. Flowers in a leafy straggling panicle. Spontaneous in Britain in hedges and dry ditches. In affinity it is nearly half-way between *R. cæsius*, and *R. corylifolius*. (Lindley, in Synopsis of Brit. Flora, ed. 2. p. 94.)

* 15. *R. FOLIOLATUS* Don. The leafy Bramble.

Identification. Don Prod. Fl. Nep., p. 256.; Dec. Prod., 2 p. 559.; Don's Mill, 2 p. 533.
Synonymes. *R. microphyllus* Don Prod. Fl. Nep., p. 234.
Spec. Char., &c. Stem procumbent, bearing recurved prickles. Leaflets 3-5, cuneate-obovate, serrated, whitely tomentose beneath. Flowers 3 upon a peduncle. Calyx without prickles, densely tomentose. Bractees small, simple. Petioles and peduncles tomentose, prickled. (Dec. Prod., ii. p. 559.) A native of Nepal, with procumbent stems, introduced in 1818, and propagated in June and July. It is said to be very nearly allied to *R. parvifolius*; and, from the appearance of a plant in the Chelsea Botanic Garden, we should consider it only a variety of *R. cæsius*.

* 16. *R. FLAGELLARIS* Willd. The Rod-like, or Runner, Bramble.

Identification. Willd. Enum., 549.; Dec. Prod., 2 p. 559.; Pursh Fl. Amer. Sept., 1 p. 37.; Don's Mill, 2 p. 533.
Spec. Char., &c. Stem round, procumbent, bearing scattered, short, hooked, prickles. Branches round, glabrous. Leaflets 3, glabrous, unequally serrated, the middle one ovate, wedge-shaped at its base; the side ones rhomb-shaped. Nerves villous. (Dec. Prod., ii. p. 559.) A native of North America, with procumbent stems, common in Virginia and Carolina, in fields and sandy woods; apparently only a variety of *R. cæsius*. It was introduced in 1789, and flowers in June and July.

Variety. * *R. f. 2 internis* Ser.; *R. internis* Willd. Enum., p. 458.; according to Link's Enum., i. p. 62.—Stems whitish, and, as well as the peduncles, devoid of prickles. Leaflets tomentose beneath. (Dec. Prod., ii. p. 559.)

* 17. *R. CORYLIFOLIUS* Smith. The Hazel-leaved Bramble.

Identification. Smith Fl. Brit., p. 549.; Smith in Eng. Bot., t. 897.; Don's Mill, 2 p. 533.
Synonymes. *R. vulgaris* Weihe & Nees, according to Lindley, Synopsis of Brit. Flora, ed. 2. p. 94.; *R. nemorosus* Hayne, according to Sprengel and Goldbach.
Engraving. Eng. Bot., t. 897.; and our fig. 457.

Spec. Char., &c. Stem angled, bearing straightish prickles. Leaflets 3-5, cordate-ovate, firm, doubly serrated, pilose beneath. Panicle nearly simple. Flowers white. Sepals ovate-acuminate, ultimately reflexed. Carpels purplish-blue, and large. (Dec. Prod., ii. p. 559.) (A native of Europe, especially of the southern part. Frequent in Britain, in hedges and thickets, flowering in July.)

Varieties.

* *R. c. 2 cæsius* Wallr. Sched., p. 231.—Leaflets all similar in form, roundish heart-shaped, whitishly tomentose upon both surfaces.

* *R. c. 3 glandulosus* Wallr. Sched., p. 231.; *R. glandulosus* Spreng., according to Wallr.; and our fig. 456.—Stems, petioles, and peduncles glandulous.

Description, &c. The stems are long and trailing, sometimes arching, glaucous and purplish in the sun, and green in the shade: they are brittle and full of pith. The flowers are large and white, and appear earlier than those



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of most of the British species. The berry is large, agreeably acid, of larger and fewer grains than in *R. fruticosus*, and of a browner black: they

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are ripened before those of *R. fruticosus* and its allies. The young shoots of the current year sometimes take root at the extremity; and country nurses and quacks formerly used to pretend to cure children of the whooping-cough, by drawing them through the arch thus formed by the stem. (Eng. Bot., ii. p. 409.)

According to Dr. Lindley, the following British kinds of *Rubus* may be associated with *R. corylifolius* Smith, either as related species, or as varieties:—*R. macrophyllus* Weihe & Nees, Eng. Bot. Suppl., t. 2625. The large-leaved Bramble. *R. carpinifolius* Weihe & Nees. The Horn-bean-leaved Bramble.

R. fusco-ater Weihe & Nees. The brownish-black Bramble.

R. Köhleri Weihe & Nees; Eng. Bot. Suppl., t. 2605.; *R. pallidus* Weihe & Nees, according to Lindley's Syn. Köhler's Bramble. *R. glandulosus* Smith. The glandulous-bristled Bramble.

R. ridis Weihe & Nees; *R. echinatus* of ed. 1. of Lindl. Synopsis, and our *H. B.*, No. 28335. The rough Bramble. *R. diversifolius* Lindl. Synopsis, ed. 1.; *R. diversifolius* Weihe, Hort. Brit., No. 28330. The diverse-leaved Bramble. Dr. Lindley has given brief distinctive characters of each of these kinds in his Synopsis of the British Flora, ed. 2.; to which work, and to our Hortus Britannicus, the reader is referred for more particulars respecting them.

* 18. *R. (C.) AGRESTIS* Willd. & Kit. The Field Bramble.

Identification. Waldest. and Kit. Plant. Bar. Hung., 3 p. 297. t. 538.; Dec. Prod., 2 p. 559.; Don's Mill, 2 p. 533.

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* 22. *R. FRUTICOSUS* L. The shrubby Bramble, or common Blackberry.

Identification. Lin. Sp., 707.; Weihe and Nees Rubi Germanici, p. 25.; Dec. Prod., ii. p. 561.; Don's Mill, 2 p. 534.
Synonymes. *R. discolor* and *R. abruptus*, in Lindl. Synopsis of Brit. Flora, ed. 1. Engraving. Eng. Bot., t. 215.; and our fig. 459.

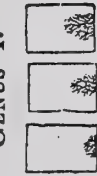
Spec. Char., &c. (Stem erect) and afterwards decurved], 5-angled, rather tomentose, bearing recurved prickles. Leaflets 3-5, ovate-oblong, acute, glabrous, beneath greyly tomentose, each on a secondary petiole. Panicle decompound, narrow, straight. Flowers rose-coloured or white. Sepals reflexed, almost without prickles. Fruit of a purplish black. (Dec. Prod., ii. p. 560.) A native of Europe, in hedges, thickets, and woods. In Britain abundant in the agricultural zone, and tolerably frequent in the upland zone; with, according to Mr. Winch, a limit similar to that of *Ulex europæa*.



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small bright red vessels, which intersect each other, and run together; a physiological peculiarity which, Michaux observes, occurs also in the red birch. In British gardens, it may be found from 12 ft. to 20 ft. high, covered with its white flowers in early spring, and very ornamental in autumn, from the fine dark red which its leaves assume before dying off.

GENUS I.



RIBES L. THE RIBES. *Lin. Syst. Pentandria Monogynia.*

Identification. *Lin. Gen.*, 281, 3 p. 471.; Don's Mill., 3 p. 177.
Synonymes. *Grossularia Tourm.*, *Gavrin.*; *Chrysobrya*, *Calobrya*, *Coresma*, and *Ribes* Spach;
Grosseller, *Fr.*; *Johannibeere*, *Ger.*; *Kruisbes*, *Dutch*; *Uva Spina*, *Ital.*; *Grossella*, *Span.*
Derivation. The word is from the name of an acid plant mentioned by the Arabian physicians, which has been discovered to be the *Rhëum Ribes*; *Grossularia* is from the Latin *Grossula*, a little unripe fig.

Description, &c. This genus consists of low deciduous shrubs, two of which (the common currant and gooseberry) are well known in British gardens, for their valuable fruits. We shall here consider all the species of the genus entirely in the light of ornamental shrubs, taking little notice of the varieties cultivated in gardens for their fruit. Many of the sorts here set down as species are, we have no doubt, only varieties; but, as we are not able to refer these to their original forms, we have followed the usual authorities, and more especially the nomenclature adopted in the Horticultural Society's Garden; a synopsis of the sorts in which, by Mr. Gordon, will be found at the end of this article. All the species of *Ribes* strike root readily from cuttings; and grow freely in any soil that is tolerably dry; but, as they are only ligneous in a subordinate degree, and are but of a temporary duration under any circumstances, they require to be grown in dry beds or borders, and are, therefore, more fitted for scientific collections or flower-borders, than for general shrubberies, undug arboretums, or lawns. The most showy species are *Ribes sanguineum* and *aureum*, and their varieties. *R. speciosum*, has a singular fuchsia-like appearance when in blossom; and *R. multiflorum*, though the flowers are greenish, is remarkably elegant, on account of the long many-flowered racemes in which they are disposed. The price, in the London nurseries, varies from 1s. to 2s. each; at Bollwyller, from 50 cents to 1 franc; and at New York, from 25 cents to half a dollar. The varieties cultivated as fruit trees are much cheaper; and *R. speciosum*, which is rather difficult to propagate, and some of the other species, which are new, and as yet rare, are dearer.

§ i. *Grossularia* Ach. Rich. *Gooseberries.*

Synonymes. *Grosseller à Maquereau*, *Fr.*; *Stachelbeere* Strauch, *Ger.*; *Kruisbes*, *Dutch*; *Uva Spina*, *Ital.*; and *Grossella*, *Span.*

Sect. Char., &c. Stems, in most instances, prickly. Leaves plaited. Flowers in racemes, 1, 2, or 3, in a raceme. Calyx more or less bell-shaped. (*Dec. Prod.*, iii. p. 478.) Shrubs with prickles; and with the leaves and fruit more or less resembling those of the common gooseberry.

972

■ 11. *R. GROSSULARIA* L. The common Gooseberry.

973

Description, Geography, &c. The gooseberry, in a wild state, is a low shrub, varying much in habit and magnitude, according to the soil and situation in which it is found. Villars, in his *Histoire des Plantes du Dauphiné*, mentions that the gooseberry is common every where in that country; that in hedges it grows to the height of 5 ft. or 6 ft., with large villous leaves; but that on mountains it is seldom found so high as 2 ft., and with very rough branches, wholly covered with yellowish stiff prickles.

In England, the gooseberry is found on old walls, in woods, and in hedges; and, in Scotland, occasionally in the neighbourhood of villages; and, though undoubtedly naturalised in both countries, it appears to us very doubtful whether it is aboriginal in either.

It is, however, truly wild in France, Germany, and Switzerland, more particularly in the Valais and in Piedmont, where it is called *griselle*, and where it is found in copse-woods, producing a small, green, hairy fruit. The common gooseberry, or a species nearly allied to it, Royle observes, is found in the Himalayas, on mountains near the almost inaccessible sources of the Ganges. There can be little doubt of its being indigenous in North America, where it is known by botanists under various names. Among other localities, we may cite as one the rocks about the Falls of Niagara, whence branches and ripe fruit have been sent to us. When the bush is of any considerable size, it is always found in a tolerably dry

and loose free soil, and in a situation rather shady than otherwise; unless we except the instances in which the seeds have been carried by birds to the tops of walls, the summits of ruins, and the hollow trunks and partially decayed branches of old trees. In the famous lime tree at Neustadt, in Wurtemberg, gooseberries are grown in the hollow branches, and the fruit sold to strangers, as mentioned in detail in p. 372.

History. The gooseberry does not appear to have been known to the ancients; and it is uncertain at what period in modern times it began to be cultivated in gardens. The earliest notice of it appears to be in the *Commentaries* of Matthioli, who states that it is a wild fruit, which may be used medicinally. Among British authors, it is first mentioned by Turner, in 1573, and afterwards by Parkinson and Gerard; the last noticing it not only for its medicinal properties, but for its use in cookery.

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976

■ 16. *R. LACU-STRE* Poir. The lake-side Currant-like Gooseberry.

Identification. *Poir. Encycl. Suppl.*, 2 p. 885.; *Dec. Prod.*, 3 p. 478.; Don's Mill., 3 p. 178.
Synonymes. ? *R. oxycanthoides Michx.* *Flor. Bor. Amer.*, 1 p. III.; *R. echinatum Douglas MS.* *Engraving.* Our fig. 724.

Spec. Char., &c. Infra-axillary prickles manifest; the stem hispid with minute prickles. Leaves lobed beyond the middle; glabrous beneath, rather pilose above. Petioles villous. Peduncles ? upright, ? reflexed, bearing 2—3 flowers upon hispid pedicels. Flowers small, yellowish green. Germen hispid. (*Dec. Prod.*, iii. p. 478.) A native of moist places in Canada and Virginia. The flowers are those of the currant, and the prickly stems those of the gooseberry. The fruit is about the size of black currants, in pendulous racemes, purplish black, shining, clothed with hairs, and unpleasant to the taste. Introduced in 1812; growing to the height of 4 ft. or 5 ft., and flowering in April and May.



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17. *R. RU'BRUM* L. The common red Currant.

Identification. Lin. Sp. 291; Dec. Prod., 3. p. 481.; Don's Mill., 3. p. 187.; Lodd. Cat. ed. 1836.
Synonyma. *R. vulgare* N. Du Ham.; Grosseller commun, Fr.; gemeine Johannisbeere, Ger.;
Rode Aaltesen boom, D. 24.
Engravings. Woodw. Bot., t. 74.; Fl. Dan., 967.; Blackw. Herb., t. 285.; Smith Engl. Bot.,
t. 1289.; Krauss, t. 84.

Spec. Char., &c. Leaves cordate, bluntly 3—5-lobed, pubescent beneath, when young, usually rather tomentose, glabrous above. Racemes drooping. Bractees ovate, shorter than the pedicels. Calyx flatly campanulate, spreading. Sepals obtuse. Petals obcordate. Fruit quite glabrous. Flowers yellowish. (Don's Mill., iii. p. 187.) Native of Europe and Siberia, in woods; and throughout Canada to the mouth of the Mackenzie; found in mountainous woods, especially in the north of England and in Scotland, about the banks of rivers; undoubtedly wild on the banks of the Tees; in the Isle of Isla, and in Culross woods, Scotland. A shrub, growing from 4 ft. to 6 ft. high, and flowering in April and May.

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18. *R. (R.) ALP'NUM* L. The alpine red Currant.

Identification. Lin. Sp. 291.; Berlandier in Mém. Soc. Phys. Gen., 3. pars 2.; Dec. Prod., 3. p. 480.; Don's Mill., 3. p. 186.
Engravings. Mém. Soc. Phys. Gen., 3. pars 2. t. 2. f. 9.; Jacq. Austr., 1. t. 47.; Schmidt Baum., t. 96.; and our fig. 725.

Spec. Char., &c. Leaves with 3—5 lobes, obtuse, hairy above, shining beneath. Racemes grouped. Bractees lanceolate, inflated, sparingly glandulose, mostly larger than the flowers. Petals minute, as if in abortion. Anthers more or less sessile. Styles connate. Berries red. (Dec. Prod., iii. p. 480.) A native of the alps of Europe and Siberia; and found, in Britain, in woods, both in England and Scotland.



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19. *R. (R.) PETRÆUM* Wulf. The rock red Currant.

Identification. Wulf in Jacq. Misc., 2. p. 36.; Don's Mill., 3. p. 187.
Synonyma. *R. alpinum* Delarb. Auzerg., p. 166.; the woolly-leaved Currant, the red Marsh-mallow-leaved Currant.
Engravings. Engl. Bot., t. 705.; Berl., 1. c. t. 2. f. 14.; Jacq. Icon., 1. t. 49.; and our fig. 727.

Spec. Char., &c. Leaves acuminate, 3—5-lobed, rather cordate, deeply serrated, on long petioles, pilose above. Racemes erect, crowded, rather pubescent. Bractees shorter than the pedicel. Sepals obtuse. Petals obcordate, small, white. Berries large, deep red, with an acid taste. Fruiting racemes pendulous. (Don's Mill., iii. 187.) Native of the alps of Carinthia, Savoy, and on almost all the mountains of the continent of Europe. In England, it is found near Eggleston and Concliffe, in the county of Durham; and in Scotland



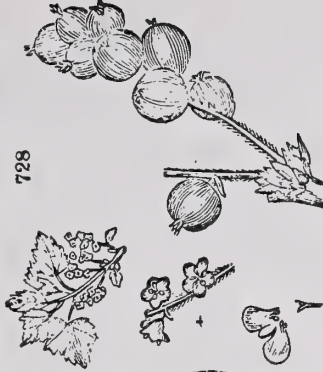
727

Dean, Northumberland. A shrub, growing 3 ft. or 4 ft. high, and flowering in May.

20. *R. (R.) SPICA'TUM* Robs. The spiked-flowered red, or Tree, Currant.

Identification. Robs. in Lin. Trans., 3. p. 240. t. 21.; Smith Engl. Bot., t. 1290.; Berl., 1. c. t. 2. f. 16.; Don's Mill., 3. p. 187.
Synonyma. The Tree Currant.
Engravings. Lin. Trans., 3. p. 240. t. 21.; Engl. Bot., t. 1290.; Berl., 1. c. t. 2. f. 16.; and our fig. 728.

Spec. Char., &c. Leaves roundish-cordate, 3—5-lobed, covered with soft hairs above, and with tomentum beneath. Racemes erect. Flowers more or less pedicellate. Bractees obtuse, tomentose, much shorter than the pedicels, Sepals roundish-cuneate. Petals oblong. Styles bifid. Berries glabrous, globose, and in colour and taste resembling those of *R. rubrum*. The tree currant affords a fruit rather smaller, and more acid, than the common red currant; but by crossing and cultivation it might, no doubt, be greatly improved; and, from its comparatively tree-like habits, might be a more convenient fruit shrub in respect to the crops around it. (Don's Mill., iii. p. 187.) Native of the north of England, in woods near Richmond in Yorkshire, and between Piersbridge and Gainford in Durham. A shrub, varying from 4 ft. to 6 ft. in height, and flowering in April and May.



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31. *R. NIGRUM* L. The black Currant.

Identification. Lin. Sp. 291.; Don's Mill., 3. p. 190.
Synonyma. *R. ulidum* Mench. Meth., 683.; Capis and Poirvriar, Fr.; schwarzze Johannisbeere, Ger.;
Engravings. Berl., 1. c. t. 2. f. 21.; Woodw. Med. Bot., t. 75.; Fl. Dan., 556.; Blackw. Herb., 285.; Engl. Bot., t. 1291.; and our fig. 734.

Spec. Char., &c. Leaves dotted from glands beneath, 3—5-lobed. Racemes loose. Bractees minute, subulate or obtuse, much shorter than the pedicels. Petals oblong. Calyx campanulate, with reflexed segments. Flowers whitish, or yellowish green. Calyx often of a rich brownish red colour,



734

or pink. Stamens sometimes more than 5, in which case there are fewer petals; so that when there are 10 stamens there are no petals.

984

Geography, History, &c. The black currant appears to have the same geographical range as the red; but it is much more abundant than that species in the north of Europe, and less so in the south. In Britain, it is not unfrequent in woods and hedges, in some districts; but it is probably not

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truly indigenous any where. It is particularly abundant in the north of Russia, where its fruit is much sought after by bears. It is found in Siberia, and on Caucasus, and is abundant in Sweden. There appear to be species of *Ribes* with black fruit in India and South America, which are probably varieties of *R. nigrum*, and may be considered as the black currant of those countries. When the black currant was first cultivated in gardens is uncertain; and there is no evidence of its having been known to the ancients, which it probably was not, on account of the plant being comparatively uncommon in the south and east of Europe. It is mentioned by Gerard, who speaks of it as having flowers of a purplish green colour, succeeded by fruit as big again as the ordinary red currant, but "of a stinking and somewhat loathing savour." The black currant is not mentioned by the earliest French horticultural writers; but in Du Hamel's *Arbres Fruitières* it is enumerated among other fruit shrubs, though it is described more as a medicinal plant than as a table fruit. Its fruit, Du Hamel says, passes for being stomachic,

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diuretic, cordial, and tonic; and a ratafia is made from it that promotes digestion. The flavour and taste of the fruit being disagreeable to many, it is still but partially cultivated in British gardens, more especially in England. In Scotland it is held in more esteem, on account of the jelly that is made from it being considered a sovereign remedy for sore throats.

Properties and Uses. The leaves, the fruit, and the entire plant, especially in a wild state, are considered powerfully diuretic; in Siberia the leaves form a principal ingredient in the drink known as quass; and the berries being fermented with honey, a powerful spirit is distilled from them. The leaves, when young, are put into spirits, so as to give the liquor a brownish tinge like that of brandy. An infusion of the young roots is given to cattle, in Russia, as a febrifuge. The leaves, in a dried state, smell like green tea; and a very small portion of them will communicate that flavour so effectually to black tea, as completely to deceive the taste. In the north of Russia, the berries of both the black and the green varieties are gathered from the woods in large quantities, dried in ovens, or in the sun, and laid up for being used in winter, either medicinally for the quinsy, and other diseases of the throat, or for making tarts. The fruit, whether fresh or dried, is also used in Sweden, and other parts of the north of Europe, as a remedy for sore throats. In England, the principal use of the fruit is for making a jam, or rob, which, like the jelly made in Scotland, is considered excellent for sore throats; but the fruit is seldom used either in tarts or puddings, or for making wine. In Scotland, the jelly is considered to add an excellent flavour to whisky and water. The treatment of the black currant, as a fruit tree, will be found in the *Encyclopædia of Gardening*, and in the *Suburban Gardener*.

CHAP. LXI.

CORNA' CEE.

1018

Geography. In America, the *Córnus florida* is first found on the Columbia river, near its confluence with the sea. In the United States, it appears in Massachusetts, between $n. \text{ lat. } 42^{\circ}$ and 43° . "In proceeding southward, it is met with uninterruptedly throughout the eastern and western states, and the two Floridas, to the banks of the Mississippi. Over this vast extent of country it is one of the most common trees; and it abounds particularly in New Jersey, Pennsylvania, Maryland, and Virginia, wherever the soil is moist, gravelly, and somewhat uneven: farther south, in the Carolinas, Georgia, and the Floridas, it is found only on the borders of swamps, and never in the pine barrens, where the soil is too dry and sandy to sustain its vegetation. In the

most fertile districts of Kentucky and West Tennessee, it does not appear in the forests, except where the soil is gravelly, and of a middling quality. (Michx.) Mr. William Bartram, in his *Travels in Georgia and Florida*, gives the following account of the appearance of this tree near the banks of the Alabama river:—"We now entered a remarkable grove of dogwood trees (*Córnus florida*), which continued nine or ten miles unaltered, except here and there by a towering *Magnòlia grandiflora*. The land on which they stand is an exact level; the surface a shallow, loose, black mould, on a stratum of stiff yellow clay. These trees were about 12 ft. high, spreading horizontally; and their limbs meeting, and interlocking with each other, formed one vast, shady, cool grove, so dense and humid as to exclude the sunbeams, and prevent the intrusion of almost every other vegetable; affording us a most desirable shelter from the fervid sunbeams at noonday. This admirable grove, by way of eminence, has acquired the name of the Dog Woods. During a progress of nearly seventy miles through this high forest, there was constantly presented to view, on one hand or the other, spacious groves of this fine flowering tree, which must, in the spring season, when covered with blossoms, exhibit a most pleasing scene; when, at the same time, a variety of other sweet shrubs display their beauty, adorned in their gay apparel; as the *Halésia*, *Stewartia*, *Æsculus*, *Pavia*, *Azalea*, &c., entangled with garlands of *Tecoma crucigera*, *T. radicans*, *Gelsemium sempervirens*, *Wistaria frutescens*, *Caprifolium sempervirens*, &c.; and, at the same time, the superb *Magnòlia grandiflora*, standing in front of the dark groves, towering far above the common level." (Bartram's *Travels*, p. 400.)

History. This fine tree was first discovered in Virginia, by Banister; and afterwards, by Catesby, in the forests of Carolina. It was cultivated in Britain by Fairchild, before 1731; and by Miller, in 1739; and has since been propagated, and introduced into our principal collections. As already observed, however, it does not thrive in the neighbourhood of London. The only instances, of which we have heard, of its flowering near the metropolis are, at South Lodge, on Enfield Chase, where Collinson informs us he went to see it when it flowered for the first time; at Syon Hill; and at Syon House. Miller, in 1752, says that the tree is common in English gardens, under the name of Virginian dogwood, that it is as hardy as any of the other species; and that, though it produces abundance of large leaves, it is not plentiful of flowers

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nor has he yet seen any plants which have produced fruit in England. There is a fine specimen at Syon Hill, upwards of 20 ft. high; and another at Syon House, 17 ft. high, both of which have flowered. There are many plants, from 6 ft. to 12 ft. high, in the grounds at White Knights, which flower freely every year.

Properties and Uses. The wood is hard, compact, heavy, and fine-grained; and it is susceptible of a brilliant polish. The sap-wood is perfectly white, and the heart-wood is of a chocolate colour. In the United States, it is used for the handles of hammers and light tools, such as mallets, &c. In the country, some farmers use it for harrow teeth, for the hames of horses' collars, and also for lining the runners of sledges; but, to whatever purpose it is applied, being liable to split, it should never be wrought till it is perfectly seasoned. The shoots, when three or four years old, are found suitable for the light hoops of small portable casks; and, in the middle states, the cogs of mill-wheels are made of them, and the forked branches are taken for the yokes which are put upon the necks of swine, to prevent their breaking into cultivated enclosures. The inner bark is extremely bitter, and proves an excellent remedy in intermitting fevers. It has been known, and successfully used, by the country people in the United States, as a specific in these maladies, for more than fifty years. (Bigelow's *Amer. Bot.*, ii. 74.) Half an ounce of dog-

wood bark, 2 scruples of sulphate of iron, and 2 scruples of gum arabic, infused in 16 ounces of rain-water, make an excellent ink. (*Michx.*) From the bark of the more fibrous roots the Indians obtain a good scarlet colour; and Bartram informs us (vol. i. p. 51.) that the young branches, stripped of their bark, and rubbed with their ends against the teeth, render them extremely white. In England, the sole use of this species is as an ornamental shrub; and, wherever it will thrive, few better deserve a place in collections.

CHAP. LXIX.

ERICA'CEÆ. CALLUNA.

1084

GENUS III.



CALLUNA Sal. THE CALLUNA. *Lin. Syst.* Octándria Monogýnia.

Identification. Salisbury in *Lin. Soc. Trans.* 6. p. 317; Don's Mill, 3. p. 828.

Synonyma. Erica sp. *Lin.* and *others.*

Derivation. The name of Calluna is derived from *kallunō*, which, as Sir J. E. Smith observes, "is doubly suitable; whether, with Mr. Salisbury and Dr. Huil, we take it to express a cleansing property, brooms being made of ling; or whether we adopt the more common sense of the word, to ornament or adorn, which is very applicable to the flowers." (*Eng. Flora*, 2. p. 224.)

2. I. C. VULGARIS Sal. The common Ling, or Heather.

Description, &c. The common heath varies considerably in size, according to the soil and situation in which it grows. In open, elevated, exposed moors, where there is scarcely any surface soil, it seldom exceeds 1 ft. in height; but in sandy soils, in open woods, it often reaches the height of 3 ft. or 4 ft., growing erect. On the sides of mountains, in Scotland and Ireland, it sometimes forms a bed or close matting of recumbent or trailing stems, which are 3 ft. or 4 ft. in length; the bed extending for many miles together. The stems are bushy, and are repeatedly and irregularly branched. The plant is of slow growth, seldom making shoots longer than 3 in. or 4 in. in one season, even when young; and, when of 5 or 6 years' growth, not more than half that length; but it is of great duration.

Geography. The common heath abounds in almost every part of Europe,

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more especially in the northern countries. It is found in Iceland, Greenland, and Kamtschatka, and in Nova Scotia and Newfoundland. In Britain, it flourishes best in the upland and moorland zones; but it descends to the sea level in the south of England. In the north, and on the Grampian Mountains, it grows at the height of 3000 ft. above the level of the sea. In deciduous copse-woods, it commonly gives place to *Vaccinium Myrtillus*; but in open pine groves it maintains its ground. It covers extensive tracts in France and Germany, and it is common in all the temperate parts of the Russian empire, and probably also, in Siberian Russia.

History. As some species of heath were known to the Greeks and Romans, it is not improbable that they were acquainted with the Calluna, though it is not included specifically in the plants of Theophrastus. It is mentioned by all the modern European writers on plants, and more especially by those of the northern parts of Europe, as its numerous names in northern languages imply. It is described by Gerard, who says that it is "the heath that the ancients took to be the right and true heath;" but he does not state his grounds for this assertion.

Properties and Uses. There are few plants, that are abundant in a state of nature, which man has not applied to a great variety of useful purposes. The most important use of the heath, throughout Europe, is as an herbage plant. In the Highlands of Scotland, in the north of Sweden, and in all heathy countries with an imperfect agriculture, cattle and sheep browse on the young shoots in the winter and spring, when they can procure no other food. It is true, these shoots are powerfully astringent, and not very nutritive; and they even affect the milk of cows not accustomed to eat them, and turn it red; but, nevertheless, they are valuable for keeping the animals alive till the season of pasture grass returns.

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GENUS XIV.



ARCTOSTA'PHYLOS Adans. THE BEARBERRY. *Lin. Syst.* Decándria Monogýnia.

Identification. Gall. Adans. Fam.; H. B. et Kunth Nov. Gen. Amer., 3. p. 277.; Spreng. Syst., 2. p. 287.

Synonymes. Uva-ursi Dod., *Tourn.*; *A. rubus* sp. *Lin.*

Derivation. From *arktos*, a bear, and *staphulē*, a grape.

Description. Evergreen undershrubs, natives of Europe and of North and South America.

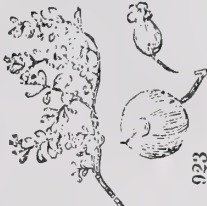
2. 1. A. UVA-URSIS Spreng. The common Bearberry.

Identification. Spreng. Syst., 2. p. 287.; Don's Mill, 3. p. 835.

Synonymes. *A. rubus* Uva-ursi *Lin. Sp.*, 566., *Fl. Lapp.*, No. 169., t. 6. f. 3., *Woodw. Med. Bot.*, 194. t. 70., *Fl. Dan.*, t. 33., *Blackw.*, t. 592., *South Eng. Bot.*, 714.; *A. rubus* *busifolia* *Stokes Bot.*, 508.; *Uva-ursi* *busifolia* *Sal.* in *Gray's Arr.*, 2. p. 400.; *Bearberries*, and *Bear-wortle* *berries*, *Eng.*; *Barentsraube*, or *Barenbeere*, *Ger.*; *Beerendruif*, *Dutch.*; *la Basserole*, *Fr.*; *Uva d'Orzo*, *Ital.*; *Uva de Oso*, *Span.*; *Uva de Urso*, *Port.*; and *Uva-ursi* in the words of most of our Botanists. *Engravings.* *Icon. Fl. Lapp.*, No. 162. t. 6. f. 3.; *Woodw. Med. Bot.*, 194. t. 70.; *Fl. Dan.*, t. 33.; *Blackw.*, t. 592.; *Engl. Bot.*, t. 714.; *Schmidt Baum.*, t. 138.; and our figs. 923.

Spec. Char., &c. Stems procumbent. Leaves permanent, obovate, quite entire, coriaceous, shining. Flowers fasciculate. Drupe 5-celled. Leaves like those of the common box. Flowers pale red, or white with a red mouth, growing in small clusters at the extremities of the branches. (*Don's Mill.*, iii. p. 836.) A trailing shrub, a native of North America, in the pine barrens of New Jersey, in mountains and rocky situations of Canada and New England, and in the Island of Unalaska. It is abundant on the continent of Europe; as, for example, in Sweden, Denmark, and most parts of the north; also in Switzerland, Germany, Carniola, Dauphiné, Savoy, Siberia, &c.

With us, it is common upon dry, heathy, mountainous, and rocky places, throughout the Highlands and Western Isles of Scotland; also in the north of England and Wales; flowering in May and June; and producing red berries, which are ripe in September. The berries are filled with an austere mealy pulp, and serve as food for grouse and other birds in Britain; and, in Sweden, Russia, and America, they form a principal part of the food of bears. The whole plant is powerfully astringent: it abounds in the tannin principle; and, both in Sweden and America, it has been used for tanning leather, and dyeing it an ash-grey colour. It is also prescribed by rural practitioners in nephritic complaints; and, on the plains of the Mississippi, it is smoked by the Indians as a febrifuge. In British gardens, it finds a place among other peat-earth plants; and, though a native of cold and elevated regions, it thrives well in peat, kept moist, in the vicinity of London.



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* 2. *A. ALPINA Spreng.* The Alpine Bearberry.

Identification. Spreng. Syst., 2, p. 287; Don's Mill., 3, p. 836.
Synonymie. *Arcturus alpina* Lin. Sp., 566; *Del. Fl. Dan.*, 73; *Smith Engl. Bot.*, t. 2030., *Lighf. Fl. Scot.*, 215. t. 11. f. a. b.
Engravings. Engl. Bot., t. 2030.; *Lighf. Fl. Scot.*, 215. t. 11. f. a. b.

Spec. Char., &c. Stems procumbent. Leaves obovate, acute, wrinkled, serrated, deciduous. Racemes terminal. Pedicels rather hairy. The flowers grow in reflexed racemes, and are pure white. The berries are black when ripe, and of the size of a sloe, with a taste somewhat resembling that of black currants, but more mawkish; inasmuch, that Linnaeus says the Laplanders will scarcely eat them. Haller, on the contrary, thinks the flavour not

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unpleasant. (*Don's Mill.*, iii. p. 836.) A trailing shrub, native of Denmark, Switzerland, Dauphiné, Savoy, Siberia, &c. Found wild in many places of the Highlands of Scotland, in dry barren moors. Nothing is more common, says Linnaeus, in all the Lapland alps, in Dalecarlia, from their tops to their bases, round the White Sea, especially in very sandy places. It is also found in Canada, and the more northern parts of America, in the Aleutian Isles, &c. In British gardens, it has long been a favourite peat-earde trailing shrub, requiring an airy situation. It does not thrive in the immediate vicinity of London, nor where it is much sheltered; but, either on rockwork, in beds of dry peat, or in moist peat, it grows with great luxuriance, and occasionally ripens fruit.

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GENUS XVI.



GAULTHERIA L. THE GAULTHERIA. Lin. Syst. Decandria Monogynia.

Identification. Lin. Gen., No. 551.; Schreb., 449.; *Gartn. Fruct.*, 63.; Juss. Gen., p. 161.; R. Br. Prod., p. 533.; H. B. et Kunth Nov. Gen. Amer., 3, p. 282.
Derivation. So named by Kalm, from *Gaultheria*, a physician and botanist of Canada.

Description. Procumbent, evergreen shrubs, natives of the colder parts of North and South America.

* 1. *G. PROCUMBENS L.* The procumbent Gaultheria.

Identification. Lin. Sp., 565.; Don's Mill., 3, p. 839.; *Lodd. Cat.*, ed. 1836.
Synonymie. Partridge Berry, Mountain Tea, Spring Winter Green, *Smith's History of Nova Scotia*.
Engravings. Andr. Bot. Rep., t. 16. Ka. Kalm, 3, p. 14. t. 1. f. 6.; Du Ham. Arb., 1, p. 266. t. 113.; *Lodd. Bot. Cab.*, t. 62.; *Sims Bot. Mag.*, t. 1896.; and our fig. 925.

Spec. Char., &c. Stem procumbent. Branches erect, naked at bottom, but with crowded leaves at top. Leaves obovate, acute at the base, finely and ciliate toothed. Flowers few, terminal, nutant. A little shrubby plant somewhat resembling seedling plants of *Kalmia latifolia*. Flowers white. Berries red, eatable, and known by the name of partridge berries.

The leaves, if properly cured, make a most excellent tea; for which reason, it is likewise known by the name of mountain tea. It was introduced in 1762, grows 4 in. or 5 in. in height, and produces it small white flowers from July to September. The flowers are succeeded by red fruit, which, in British gardens, remain on the plant a great part of the winter. It is difficult to preserve alive, except in a peat soil kept moist. (*Don's Mill.*, iii. p. 837.) A native of North America, in dry woods, on mountains, and in sandy places, from Canada to Virginia.

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GENUS XXVI.



VACCINIUM L. THE WHORTLEBERRY. Lin. Syst. Oct-Decandria Monogynia.

Identification. Lin. Gen., 191.; *Alt. Hort. Kew.*, 2, p. 355.; *Pursh Fl. Bor. Amer.*, 1, p. 292.; Juss. Gen., 102.; Nutt. Gen. Amer., 1, p. 493.; Lam. Ill., 286.; *Gartn. Fruct.*, t. 28.; Don's Mill., 3, p. 851.
Synonymie. *Vitis idæa Toura. Jacq.*, t. 377.; *Airelle, Fr.*; Heidelbeere, *Ger.*
Derivation. An ancient Latin name, but whether of a berry or a flower, has been a point in dispute among critics, as well as its etymology.

Description. The species are shrubs, varying in height from 6 in. to 10 ft., some natives of Europe, but the greater part of North America. They are gemmaceous, with the bud scales often permanent on the base of the small branches; and the leaves often beset with resinous dots. The flowers are pedicellate, and either in solitary racemes, or in tufts. They are generally drooping, inodorous, tinted with various shades of red or pink, never blue, and scarcely ever yellow. They are succeeded by berries, black, purple, bluish, or red, covered with a fine bloom, generally eatable: some of them agreeable, and excellent in tarts; and others austere, acid, and scarcely whole-some in a raw state. In general, it may be observed, that the species are in a good deal of confusion, from the whole of them never having been studied together in the same garden. We have followed the arrangement of G. Don, as the latest and best, not having had an opportunity ourselves of examining all the species said to be in cultivation in British gardens. The best collection of large plants of the genus *Vaccinium*, in England, is at White Knights; and of plants for sale, at Messrs. Loddiges's. Price, of the common sorts, from 1s. 6d. to 2s. 6d. each; of the rarer kinds, from 3s. to 5s. each.

A. Leaves deciduous.

a. Pedicels 1-flowered, usually solitary, rarely twin, or fasciculate.

* 1. *V. MYRTILLUS L.* The Little-Myrtle-like Whortleberry, or common Bilberry, or Huckleberry.

Identification. Lin. Sp., 498.; *Ger. Emac.*, 1415.; *Math. Valgr.*, 1, p. 410.; *Cam. Epit.*, 135.; *Smith Engl. Fl.*, 2, p. 219.; Don's Mill., 3, p. 851.; *Lodd. Cat.*, ed. 1836.
Engravings. Engl. Bot., t. 436.; *Fl. Dan.*, t. 574.; and our fig. 969.

Spec. Char., &c. Pedicels solitary, 1-flowered. Leaves serrated, ovate, smooth.

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Stem acutely angular, smooth. Calyx hardly divided. Corolla globose, generally 5-cleft, of a very delicate, waxy, pink hue. (*Don's Mill.*, iii. p. 852.) A shrub, from 6 in. to 2 ft. high; a native of heaths, stony moors, and mountain woods, throughout most parts of Europe, especially the more northern countries; and also in the north of Africa and Asia; and at Nootka Sound and Nova Scotia, in America. It is plentiful in Britain and Ireland, and also in Iceland. According to H. C. Watson, it becomes procumbent about the subalpine zone in England, and rarely produces flowers. Only the loftiest mountains in Scotland rise sufficiently high to arrest its ascent. It is seen on the summit of

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Ben Lawers, 4000 ft. above the level of the sea, and on some other mountains rather higher. In general, it grows at elevations of from 200 ft. to 600 ft. higher than *E. nigrum*. It is found in every country in Britain, from Cornwall to Caithness, least frequently in the south-eastern countries, and increases in quantity as we advance northward. "This is one of the species," Mr. Watson observes, "that, if allowed, would overrun Britain, and form, with *Calluna vulgaris* and *E. nigrum*, much of the natural physiognomical character of its vegetation." (*Outlines*, &c., p. 201.) The berries of this species are of a bluish black, about the size of currants, and covered with a mealy bloom: they are eaten in tarts, or with cream, or made into jelly, in the northern and western counties of England and Scotland; and, in other parts of the country, they are made into pies and puddings. In Devonshire, the berries are eaten with clotted cream; in Poland, mixed with wood strawberries, and eaten with new milk; they are considered a great delicacy. Their juice has been employed to stain paper or linen purple. In autumn, many kinds of game live upon their berries, and the plant affords them shelter. In gardens, it may be cultivated in sandy peat, kept moist, in a situation airy, but somewhat shaded.

Variety.

V. M. 2. baccis albis has white fruit. At the moment when we were writing this article (June 6, 1836), Mr. John Booth of the Floetbeck Nursery, near Hamburg, called on us, and, among other information, stated that a patch of 154 plants of this variety had lately been discovered in the Black Forest, and that he had plants of it for sale.

Mr. Menzies brought from the west coast of North America specimens of what may be considered as a gigantic variety of *V. Myrtillus*, which he found growing there to the height of 7 ft. or 8 ft.; but it has not yet been introduced.

V. ULIGINOSUM L. The bog Whortleberry, or great Bilberry.

Identification. Lin. Spec. 499; Smith Eng. Fl., 2. p. 210.; Don's Mill. 3. p. 851.; Lodd. Cat. ed. 1835. *Synonymy.* *Myrtillus grandid Bank. Hist.*, 1. p. 518.

Engravings. Eng. Bot., t. 581.; Fl. Dan., t. 231.; and our fig. 970.

Spec. Char., &c. Pedicels somewhat aggregate, 1-flowered. Leaves obovate, entire, smooth. Branches terete. Taller than the common bilberry, and of a more glaucous hue. Leaves glaucous beneath. Flowers flesh-coloured, with 8 long-horned stamens. Berries large, juicy, black, and covered with a mealy bloom. (*Don's Mill.*, iii. p. 852.) A shrub, about 2 ft. high; a native of Sweden, Germany, Siberia, Switzerland, Savoy, Scotland, and the north of England; as well as in the more northern parts of America, and on its west coast; and on the Island of St. Ichna, and in the north of Asia, in marshy mountain heaths and alpine bogs. In Scotland,

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it flourishes, at an elevation of between 2000 ft. and 3000 ft., on the Grampians; and at the height of 3500 ft. in Aberdeenshire. It is said to cover extensive tracts of land on the west coast of Greenland, along with *Andrœda tetragona*. (*Cassiope tetragona* D. Don.) On the Carpathian Mountains, it grows at an elevation of 6000 ft. (*Watson*.) It produces its flowers in April and May. The berries are agreeable, but inferior in flavour to those of *V. Myrtillus*; eaten in large quantities, they occasion giddiness, and a slight headache. In France, they are used to colour wines red; and in



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Siberia and Sweden they furnish an ardent spirit that is highly volatile and intoxicating. They afford excellent sustenance to game. The leaves are added to *Lycopodium alpinum* by the Icelanders; and a yellow dye, for colouring woollens, is produced by an infusion of the two plants. In gardens, it may be cultivated like the preceding species.

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till June. It was introduced in 1800; and, though commonly grown only as an ornamental shrub, yet might be cultivated for its fruit, which is produced in very great abundance, is agreeable to the taste, and makes excellent tarts. There are plants at White Knights upwards of 10 ft. high, and there are others in the Knaphill Nursery 6 ft. high, which produce abundance of fruit every year. All the culture required is, to place the plants in sandy peat, or in peat and leaf mould, kept moist. There seems to be a good deal of confusion, in British gardens, between this species and the following one, and we have not been able to satisfy ourselves on the subject. All that we can state with certainty is, that there are plants bearing the name of *V. Arctostaphylos* in Loddiges's arboretum, and the other places mentioned, which answer to the description given, and are well worth cultivating for their fruit.

V. (?) A. PADIFOLIUM Smith. The Bird-cherry-leaved Bear's Grape. Whortleberry.

Identification. Smith in Rees's Cycl. No. 92.; Don's Mill. 3. p. 854.; Lodd. Cat. ed. 1835. *Synonymy.* *V. Arctostaphylos Andr. Bot. Rep.*, t. 30.; Curt. Bot. Mag., t. 974.; *V. maderense Link. Engraving.*, p. 375.; *V. caucasicum Hort.*; *V. padifolium caucasicum Hort. Soc. Cat. of Fruit*, edit. 1836, p. 903.

Engravings. Andr. Bot. Rep., t. 30.; Curt. Bot. Mag., t. 974.; and our figs. 985, 986.

Spec. Char., &c. Racemes lateral. Bractæas all at the base of the pedicels. Leaves ovate-lanceolate, acute, serrulated, smooth on both surfaces, except the midrib. Stamens nearly as long as the bell-shaped corolla, with smooth, slightly fringed filaments. Calyx 5-lobed. Corollas larger than those of *V. Arctostaphylos*, pale green, with a purple tinge: sometimes it appears to be all over purple externally. (*Don's Mill.*, iii. p. 854.) The Caucasian plant, discovered by Pallas, is said not to differ from that of Madeira. Pallas says the berries are black, juicy, eatable, and gratefully acid; and he sometimes found the flowers 4-cleft. A shrub, from 6 ft. to 10 ft



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high; a native of Madeira, on the loftiest parts of the island, where it forms impenetrable thickets. It was introduced in 1777, and flowers from June till August. From observing the plants of this alleged species, of large size, in the Knaphill Nursery, in the Hammersmith Nursery, and in the Horticultural Society's Garden, we are inclined to think that it is nothing more than a variety of *V. Arctostaphylos*.

A. Leaves evergreen.

a. Flowers racemose.

23. *V. CARACASANUM* H. B. et Kunth. The Caracas Whortleberry.

Identification. H. B. et Kunth Nov. Gen. Amer., 3. p. 266.; Don's Mill., 3. p. 855. *Spec. Char., &c.* Racemes axillary, twice as long as the leaves. Flowers secund, octandrous or



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Description. *Calyc* 4-toothed. *Corolla* 4-parted, with nearly linear, revolute segments. *Stamens* 8, with connivent filaments. *Anthers* tubular, 2-parted. *Berries* many-seeded.—Small, prostrate, trailing, evergreen shrubs, with small leaves, growing in boggy morasses, often among living masses of Sphagnum. Branches filiform, proliferous. Flowers produced at the base of the spring branchlets, in short gemmaceous racemes. Pedicels filiform, conspicuously bibracteate. Berries red, rarely white, acid. (*Don's Mill*, iii. p. 858.) Natives of Britain and North America.

2. 1. O. PALUSTRIS Pers. The marsh, or common, Cranberry.

Identification. Pers. Ench., i. p. 419; Don's Mill, 3. p. 858. *Synonymes.* *O. vulgaris* Pursh Fl. Amer. Sept., i. p. 583; *O. europæus* Nutt. Gen. Amer., i. p. 251; *Yuccinum* Oxycoccus Lin. Sp., 500; Smith Eng. Bot., 319; *Ed. Fl. Dan.*, t. 30; *Yuccinum* Oxycoccus var. *ovalifolius* Michx. Fl. Bor. Amer., i. p. 253; *Yuccinum* Oxycoccus, Forster, Lob. Icon., 2. t. 109; *Oxycoccus* Cr. Hist. Nat. p. 130; *Oxycoccus*, Forster, Lob. Icon., 2. t. 109; or *Whortleberries*, *Cranberries*, Eng.; *Airelle* canberge, Fr.; *gemmae* Moose-berries, Ger.

Derivation. The name of Cranberry is supposed to be given from the peduncles of the flowers being crooked at the top, and, before the expansion of the flowers, resembling the head and neck of a crane (*Smith and Eng. Bot.*), or because they are much eaten by cranes.

Engraving. Eng. Bot., t. 319; *Ed. Fl. Dan.*, t. 30; Lob. Icon., 2. t. 109; and our fig. 992.

Spec. Char., &c. Stems filiform, trailing. Leaves small, ovate, entire, acute, smooth, with revolute margins. Pedicels terminal, 1-flowered, of a delicate pink or rose colour. Segments of corolla oval. Leaves convex, and dark shining green above, and glaucous beneath. Stems reddish. Pedicels few together, about the tops of the branches, red, slightly hoary. Corolla pink, with reflexed oblong segments. Stamens with purple downy filaments, and yellow anthers. Berries pear-shaped, globular, often spotted, crimson, of a peculiar flavour, with a strong acidity, grateful. (*Don's Mill*, iii. p. 858.) A low, trailing, subevergreen shrub; seldom rising higher than 3 in. or 4 in.; flowering in May and June, and ripening its fruit in August and September. It is a native of turf mossy bogs in the mountainous parts of Europe; common in Switzerland, Russia, Scotland, Ireland, and the north of England, as well as in the east, as in Lincolnshire and the neighbourhood of Norfolk. Pursh speaks of it as common on the boggy mountains of North America, from Canada to Pennsylvania, and in the Island of Oonalashka,



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where it is a creeping shrub, flowering in May and June. Pallas says it is found in turf bogs, in the north of Russia, and throughout the whole of Siberia, as far as the Northern Ocean. The berries remain during the whole winter under the snow; and are collected in spring, after it is thawed and gone, as well as in autumn, before it falls. In the north of Europe, as well as in Britain, cranberries have been in use from time immemorial, for supplying an acid drink during the hot summer months, for tarts, and other purposes. For culinary purposes, they are exported from Russia and Sweden to most parts of Europe. During the latter end of the last century, cranberries from Lincolnshire and the north-west corner of Norfolk were sold in the streets of Norwich by cart-loads; but the extensive enclosures that have been made since that period have, in many parts, destroyed their native bogs. Lightfoot records that at Longtown, on the borders of Cumberland, not less than 200, or 300, worth were sold each market day, for five or six weeks together, and dispersed over different parts of the kingdom. (The numerous enclosures, drainages, and improvements of heath and bog lands, which have

decandrous. Leaves elliptic, acute, crenulated, coriaceous, glabrous, shining above. Anthers 2 horned on the back. Branchlets angular, glabrous. Leaves shining above, 9–10 lines long. Racemes crowded at the tops of the branchlets. Corolla campanulate, glabrous, reddish white, with a 4–5-parted limb. Segments ovate, acute. Filaments membranous, ciliated. (*Don's Mill*, iii. p. 855.) It is a native of the declivity of Mount Silla de Caracass, where it is a shrub, flowering in May and June. It was introduced in 1825.

2. 4. V. VIRIS IDÆA L. The Mount Ida Whortleberry, or Cowberry.

Identification. Lin. Sp., 500; Eng. Fl. 2. p. 920; Don's Mill, 3. p. 855; Lodd Cat., ed. 1856.

Synonymes. *Vitis idæa rubra* Com. Epit., 136; the red Whortleberry.

Engraving. Lodd. Bot. Cab., t. 1023; Eng. Bot., t. 598; Fl. Dan., t. 40; and our fig. 997.

Spec. Char., &c. Racemes terminal, drooping, with ovate concave bracteas, which are longer than the pedicels. Leaves obovate, revolute, minutely toothed, dotted beneath. Corolla bell-shaped. Root creeping, woody.

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Stems ascending, a span high. Young branches terete, downy. Leaves like those of box, but darker. Flowers pale pink, 4-cleft, octandrous. Anthers without spurs. Berries blood-red, acid, austere, and bitter; less palatable than either the cranberry or bilberry. (*Don's Mill*, iii. p. 855.) It is a native of dry, barren, stony woods and heaths, in the north of Europe; plentiful in Scotland, Westmoreland, Derbyshire, and Wales. Mr. Pursh says it occurs on rocks near the sea coast, from Canada to New England; but the American plant is more robust than the European, with considerably larger leaves. Pallas states that it is found in the whole of Russia, and throughout Siberia, more especially in pine woods. It grows, in elevated exposed situations, to the height of 5 in. or 6 in.; but, in sheltered places in sandy peat soil, it attains the height of 1 ft., producing its pale flesh-coloured flowers in May and June, and ripening its fruit from August to October, according to the season. The berries are scarcely to be eaten raw; but they are made into pies in Derbyshire; and, in Sweden, a rob, or jelly, is made from them, which is eaten with all kinds of roast meat, and is considered preferable to red currant jelly as a sauce for venison. In Sweden, this preserve is also considered an excellent medicine in colds, sore throats, and all irritations of the mouth or fauces. In Siberia, the berries are macerated, during the autumn and part of the winter, in water; and afterwards they are eaten in a raw state, and fermented along with barley or rye, and a spirit distilled from them; or with honey, and a wine produced. Sweetmeats are also made of them with honey or sugar, which, in 1814, we found in frequent use in Moscow, at balls and masquerades. In Sweden and Norway, the plant is said to be used in gardens for edgings, as box is in Central Europe; and, in British gardens, it is sometimes so applied to American beds and borders, and in other cases where the soil is peat. From its smooth shining foliage, and the beauty of its flowers and fruit, the latter being retained on the plant for several months, it forms a more beautiful and varied edging than box, provided clipping can be dispensed with. The berries of this plant form an important article of commerce in the sea ports bordering the Gulf of Bothnia, whence they are sent to the south of Europe along with cranberries.

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OXYCOCUS Pers. THE CRANBERRY. Lin. Syst. Octándria Monogýnia.

Identification. Pers. Syn., i. p. 419; Pursh Fl. Amer. Sept., i. p. 253; Nutt. Gen. Amer., i. p. 250; Don's Mill, 3. p. 857.

Synonymes. *Yuccinum* up. of Linn. and others.

Derivation. From *oxis*, sixty, and *kottar*, a berry; in reference to the sharp acid taste of the berries.

taken place since the commencement of the present century, have nearly destroyed all our native cranberries; and England is now chiefly supplied with cranberries from Russia and Sweden, and with the sort produced by *O. macrocarpus* from North America. The Russian cranberries are considered to be superior in quality to those of America. The total quantity from both countries imported, according to McCulloch, is from 30,000 to 35,000 gallons annually.

Properties and Uses. The berries are powerfully acid and astringent, and they have a peculiar flavour, which is agreeable to some, though disliked by others. In a wild state, they are eaten by cranes and other birds. They may be kept several years, if gathered when quite dry, and then closely corked in dry bottles, and placed in a cool dry cellar. They will also keep in bottles or in casks of water; which last mode is that practised in the north of Europe and America, and in which state they are exported from place to place as articles of commerce. In Sweden and Russia, they are used for tarts and sweetmeats, and the expressed juice is considered efficacious in fevers. The bankers in Russia, Pallas informs us, make use of the fruit for whitening their silver money, which they do by boiling it in the juice, when the sharp acid dissolves the superficial particles of the copper alloy. The same thing is done in Sweden to whiten silver plate. In Britain, almost the only use to which the berries are applied is that of making tarts; and for this purpose, since the plant in a wild state has become scarce, this species and *O. macrocarpus* have been cultivated in various gardens. (See *Encyc. of Gard.* ed. 1832, p. 137.) In Russia, and in some parts of Sweden, the long filiform shoots of the *oxy-coccus* are collected in spring, after most of the leaves have dropped off, and are dried, and twisted into ropes, which are used to tie on the thatch of houses, and even for harnessing horses.

Propagation and Culture. The plant is abundantly increased by laying sandy soil on its shoots, at the distance of 5 in. or 6 in. from its main stem, when it will send down roots abundantly. When it is to be grown for its fruit, a bed of peat soil should be prepared in an open airy situation, where it can be kept moist; or the margin of a pond may be made choice of, and the plants planted there in peat soil, in a bed encircling the pond, 1 in. or 2 in. above the level of the water, and about 1 ft. distant from it. The cranberry may also be grown in beds of dry sandy peat; and it is alleged by some who have tried this method in British gardens, that the fruit produced, though smaller in quantity, is of a better flavour. We have little doubt of this, arguing from general principles; and we think it probable that the fruit would be further improved, both in bulk and flavour, if it were grown in peat and leaf mould, rather than in peat alone. A bed, containing a very few square yards, will produce a considerable quantity of fruit, though not nearly so much as a bed of equal extent of the American cranberry, to be next described.

ARBORETUM ET FRUTICETUM BRITANNICUM;

VOL. III.

FROM ASCLEPIADÆ CÆRE, P. 1257., TO CORYLIA CÆRE, P. 2030., INCLUSIVE.

SECOND EDITION.

LONDON:

PRINTED FOR THE AUTHOR;

AND SOLD BY

LONGMAN, BROWN, GREEN, AND LONGMANS,

PATERNOSTER-ROW.

1844.

1332

GENUS III.



BUXUS Tourn. *The Box Tree.* *Lin. Syst. Monoc'cia Tetrandria.*
Identification. Tourn. Inst. t. 345.; Lin. Gen. 486.; Smith Eng. Flora, 4. p. 132.; Theodor Nees ad Eschsch. Gen. Plant. Flora Germanice, fasc. 3. t. 16.
Synonymica. Buis, Fr.; Buxbaum, Buchsbaum, Ger.

1334

History. The box tree appears to have been first mentioned by Theophrastus, who ranks the wood with that of ebony, on account of the closeness of its grain. Pliny describes it as being as hard to burn as iron, as producing no flame, and as being totally unfit for charcoal. He distinguishes three kinds, which he calls the larger, the smaller, and the Italian box; and speaks of the use of the tree for topiary work, and of the wood for musical instruments. Vitruvius also recommends the box for topiary work; and it appears to have been much employed in verdant sculpture, and close-clipped hedges, in the gardens of Roman villas in the Augustan age. Pliny describes his Tusculan villa as having a lawn adorned with figures of animals cut out in box trees, answering alternately to one another. This lawn was again surrounded by a walk enclosed with evergreen shrubs, sheared into a variety of forms. Beyond this was a place of exercise, of a circular form, ornamented in the middle with box trees, sheared, as before, into numerous different figures; and the whole fenced in by a sloping bank, covered with box, rising in steps to the top. In another part of the grounds of the same villa, the box is mentioned as being cut into a variety of shapes and letters; some expressing the name of the master, and others that of the artificer, &c. (*Plin. Epist.*, book v. letter vi.) The same practice is followed in several Roman gardens at the present day; and, in that of the Vatican, the name of the pope, the date of his election, &c., may be read from the windows of the palace in letters of box. Virgil calls it

"Smooth-grain'd, and proper for the turner's trade,
Which curious hands may carve, and steel with ease invade."

Darwin's *Virgil*.

1335

Both Virgil and Ovid allude to the use of this wood for musical instruments, and employ the word box as if synonymous with that of flute. In more modern times, in Britain, it is mentioned by Turner, Gerard, Parkinson, and other writers on gardening and rural affairs; and, previously to the eighteenth century, was in great repute for gardens in the geometric style, from the facility with which it could be made to assume whatever form the gardener wished: it was also highly valuable when there were but few evergreens grown in England, from its hardy habit, and the liveliness of its hue. The wood of the tree has

been in use for turnery from the earliest ages, and for wood engraving since the fifteenth century.

Properties and Uses. The wood of the box is remarkably heavy; weighing, when newly cut, 80 lb. 7 oz. per cubic foot, and, when perfectly dry, 68 lb. 12 oz. and 7 gr. It is the only European wood that will sink in water: it is yellow, very hard, and susceptible of a fine polish. The wood was formerly much used in England in cabinet-making and inlaying, as it still is in France; and, also, in both countries, for musical and mathematical instruments, combs, and various articles of turnery. The principal use of the boxwood, however, at present, is for wood engraving; and for this purpose it is an important article of commerce.

1444

Y 4. C. TOMENTO'SA Nutt. The tomentose Carya, or Mocker-nut Hickory.

Identification. Nutt. Gen. N. Amer. Pl., 2, p. 221.
Synonymy. *Juglans alba* Lin. Sp. Pl., 1415., according to Willd. Sp. Pl., in Pursh's *Flora*, this is referred to *J. alba* Michx. Fl. Bor. Amer., C. alba Nutt.; *J. alba* Nutt., No. 4, *Du Roi Harb.*, 1, p. 532. *Kalm in Act. Holm.*, 1769, p. 171., *Wangh. Amer.*, 23., *Willd. Sp. Pl.*, 4, p. 451.; *J. tomentosa* Michx. Fl. Bor. Amer., 2, p. 192., *Arb.*, 1, p. 186., *North Amer. Sylva*, 1, p. 176., *Pursh Fl. Amer. Sept.*, 2, p. 637.; *White-heart Hickory*, common Hickory, *Amer.*; *Noyer dur*, *Illinois Engravings*, *Wangh. Amer.*, 2, 3, t. 10, f. 22.; *Michx. Arb.*, 1, t. 6.; *North Amer. Sylva*, 1, t. 35.; and our fig. 1267.

1445

Description, &c. The mocker-nut hickory, Michaux informs us, is a tree about 60 ft. in height, and 18 in. or 20 in. in diameter. The buds of this species are large, short, of a greyish white, and very hard. In winter, they afford a characteristic by which the tree is easily distinguishable from all others of the same genus. In the beginning of May, the buds swell, the external scales fall off, and the inner ones burst soon after, and display the young leaf. The leaves grow so rapidly, that Michaux has seen them gain 20 inches in 18 days.

"They are composed of 4 pairs of sessile leaflets, terminated by an odd one. The leaflets are large, ovate-acuminate, serrate, pretty thick, and hairy underneath, as is the common petiole to which they are attached. With the first frosts, the leaves change to a beautiful yellow, and fall off soon after. The barren flowers appear on pendulous, downy, axillary catkins, 6 in. or 8 in. long; the fertile flowers, which are not very conspicuous, are of a pale rose colour, and are situated at the extremity of the young shoots." (*N. Amer. Syl.*, i. p. 178.) The fruit is ripe in November, and varies very much in size and shape. The shell is very thick, and extremely hard; and the kernel, which is sweet, though small, is so difficult to



1267

extract, because of the strong partitions which divide it, as to have given a rise to the name of mocker nut. The trunk of the old trees is covered with a thick, hard, rugged bark; and the wood is remarkable for its strength, tenacity, and durability. The heart-wood of the young trees is white; and hence the name of white-heart hickory, by which this tree is known in some parts of America. This tree is found principally in the forests which remain on the coast of the middle states; but it is rarely found in the Carolinas or Georgia, or north of Portsmouth, in New Hampshire. It is the only hickory which springs in the pine barrens.

CHAP. CIII.

SALICACEÆ. SALIX.

1456

The species indigenous to North America are not very numerous; but Pursh has described 37 sorts, as either wild or in a state of cultivation there. The number of species in different countries, however, cannot at present be determined with anything like accuracy, since what are considered as species by some botanists are looked upon as only varieties by others. Thus, Schleicher finds 119 species within the narrow limits of Switzerland; Host, 60 species natives of Austria; and Smith, and other British botanists, 71 species indigenous to Britain. Koch, however, the latest, and, as it appears to us, the most judicious, writer on the genus *Salix*, considers that all the alleged species, natives of Europe, may be reduced to 48. Perhaps, in addition to these, there may be a dozen natives of North America, which are not natives of Europe; and half that number natives of Asia. Of 182 species described by botanists, Koch observes, 17 only are extra-European.

History. Theophrastus and Pliny speak of different sorts of willows; the latter describing 8 species, as among the most useful of aquatic trees, not even excepting the poplar and the alder. The willow, Pliny says, furnishes long props for supporting vines, and the bark may be employed for tying up the shoots; and the young shoots, he adds, are much employed in basket-making. The kinds which the Romans used for this purpose appear, from Pliny's descriptions, to have been the *S. alba*, *S. vitellina*, *S. viminalis*, and the *S. americana* of Pliny and Dalechamp, which was probably, as Dr. Walker thinks, the white willow of Theophrastus, and is certainly the *S. decipiens* L. These kinds formed the osier holts of the Romans, and are still those principally cultivated for basket-making, throughout Europe and North America, in the present day. Among modern botanists, the Bauhins, in 1650, first began to distinguish willows by their magnitude, the shape of their leaves, and by the nature of their flowers and fruit; and these authors were also the first to recognise in each species a fertile and an unfertile individual; and, with Tragus, to assert that willows could be propagated from seed, like other plants; a fact that had been denied since the days of Aristotle. Scopoli, in his *Flora Carniolica*, published in 1760, relates that he had often observed female willows fecundated by males which are accounted of a different species; and, if this observation is correct, it will help to account for the great number of kinds which compose this genus. The scientific botanical history of the willow may be considered as commencing with Ray's *Synopsis*, in 1660, in which he describes 10 species as growing in the neighbourhood of Cambridge. Linnaeus, in 1737, described, in the *Flora Lapponica*, 19 species, chiefly alpine kinds; and in the second edition of his *Species Plantarum*, published in 1753, 31 species. Haller, in 1758, described 21 species as natives of Switzerland; and Villars, in 1789, 30 species as natives of Dauphiné. Willdenow, in his edition of Linnaeus's *Species Plantarum*, published in 1797, describes 116 species. Smith, in Rees's *Cyclopædia*, published in 1819, describes 141 species; to which Willdenow and other botanists have since added, according to Koch, 41 species

more, making in all 182; adding to these Schleicher's 119 new species, the total number is 254! In 1788, Hoffmann published the first fasciculus of his elaborate *History of Willows*, the last fasciculus of which came out in 1791; but the work was never completed. In so far as it goes, it is a splendid work; and one which can scarcely be surpassed either for accuracy or beauty. In 1828, Professor Koch, director of the botanic garden at Erlangen, published his *De Salicibus Europæis Commentatio*, an admirable work, of which a more particular account will be given here after; in which he has reduced all the European sorts, amounting, as we have just seen, to 237 (17 of the 254 being extra-European), to 48 species, belonging to 10 groups. Subsequently to the appearance of Koch's work, Dr. Host, director of the Flora Austriaca Botanic Garden at Vienna, published his *Salix*; of which only the first volume ap-

1457

peared before the author's death. This volume is limited to figuring and describing the willows of Austria, amounting to 60 sorts; of which engravings are given of both sexes, on extra-large folio plates: the specimens being of the natural size, and mostly from 1 ft. 6 in. to 2 ft. in length; exhibiting both sexes when in flower, when the leaves are fully expanded, and the female catkins matured. This is indeed a splendid work, and only equalled by the small portion which appeared of the *Historia Salicum* of Hoffmann, before mentioned. A great drawback, however, to the utility of Host's work is, that the author has given new names to most of his sorts, and has identified but a very few of them with the kinds described by other botanists.

In 1829, His Grace the Duke of Bedford had printed, for private circulation, the *Salicetum Woburnense*, in which 160 species are figured and described; all of which, with the exception of a very few, were at that time alive in the salicetum at Woburn. The engravings are small, but good; the descriptions are chiefly taken from Smith, but are partly original, by Mr. Forbes, the Duke of Bedford's gardener. "We have in the *Salicetum Woburnense*," Sir W. J. Hooker observes, "a standard set of figures of all the British, amongst many exotic species; which, together with those of the *English Botany*, do, it must be confessed, give to the British naturalist an advantage over all that Continental authors have published on the subject; and to them I refer in every instance, and with great satisfaction." The arrangement of the species in the *Salicetum* is due to the botanical skill and knowledge of Mr. Forbes, head gardener at Woburn, which His Grace has fully acknowledged; and that department does him great credit." (*Br. Fl.*, i. p. 416.)

In 1831, Sir W. J. Hooker, in the second edition of his *British Flora*, had, with the aid of Mr. Borrer, arranged the British species in 18 groups, and enumerated under these 68 species, considered by him and others as indigenous; which, in the third edition of the *British Flora*, published in 1835, were increased to 71. In the same year (1835), Dr. Lindley adopted the system of Koch in his *Synopsis of the British Flora*, 2d edit., and reduced the 71 species of Smith and others to 28 species.

The willows of North America were, as far as they were known in 1814, described by Pursh, with the assistance of Mr. G. Anderson, who had in cultivation several rare species from that country; and some species have subsequently been added by Nuttall. Since then, Dr. Barratt of Middletown, Connecticut, has undertaken to describe all the willows grown in America, whether indigenous or exotic, amounting to 100, a conspectus of which he has sent to Sir W. J. Hooker, arranged in 9 groups, chiefly the same as those of Mr. Borrer. Cuttings of most of these 100 sorts have been received by the Duke of Bedford, and planted in his salicetum at Woburn, where many of them are alive. Some other particulars respecting them will be found in the *Companion to the Botanical Magazine*, vol. i. p. 17. As Dr. Barratt's descriptions must necessarily, in great part, be taken from dried specimens, it appears to us very

doubtful how far they will be of use to the European botanist; but there can be no doubt as to the benefit which will result from the introduction of all these sorts into British gardens, because there they may be compared in a living state with the kinds we already possess.

Lightfoot, in his *Flora Scotica*, paid considerable attention to willows; but, according to Sir J. E. Smith, "he laboured at the subject with hesitation and mistrust, from an opinion of the species being confounded by cross-impregnation." Lightfoot, and his contemporary Hudson, therefore, Sir James adds, have hardly enumerated a fourth part of the native willows of our island. The cultivation of willows, with a view to the determination of their specific characters, was, according to Sir J. E. Smith, first taken up with vigour and effect by James Crowe, Esq., F.L.S., of Lakenham, near Norwich, "a most excellent British botanist," about the end of the last century; and Sir James E. Smith, writing in 1828, says that he had laboured full 30 years in the study of willows in Mr. Crowe's garden, which contained all the sorts that could then be procured in any part of Britain. (*Rees's Cycl.*) Mr. George

1458

Anderson, F.L.S., had at that time a collection at West Ham, in Essex, which he was studying for the same purpose; as had Edward Forster, Esq., at Walthamstow, and which has since been removed to Woodford, in Essex; and W. Borrer, Esq., at Henfield, in Sussex. At Lewes, in the same county, Mr. Woolgar had extensive willow grounds, studied the species very assiduously, and communicated several facts to Sir J. E. Smith. Subsequently, a collection was made by His Grace the Duke of Bedford at Woburn, which appears to have been the most extensive till then made in England; and the next greatest number of sorts is in the arboretum of Messrs. Loddiges, at Hackney. In all these salicetums, we are informed by those who have examined them, the plants were placed too closely together to attain their characteristic form and size. At Woburn, the plants were, till 1836, crowded together in a very limited space, which necessarily prevented their habits from being properly studied; but they have since been transplanted, and allowed more room; though they are not, even now, as it appears to us, in a situation either sufficiently large, or adequately exposed to the influence of the sun and the air. A few species of willows have attained the size of trees in the Horticultural Society's Garden; but, as far as we are aware, there is no extensive collection of full-grown willows anywhere either in Britain or on the Continent.

1459

Properties and Uses. The importance of the willow to man has been recognised from the earliest ages; and ropes and baskets made from willow twigs were probably among the very first of human manufactures, in countries where these trees abound. The Romans used the twigs for binding their vines and tying their reeds in bundles, and made all sorts of baskets of them. A crop of willows was considered so valuable in the time of Cato, that he ranks the salicetum, or willow field, next in value to the vineyard and the garden. In modern times, "the many important uses," Sir W. J. Hooker observes, "rendered to man by the different species of willow and osier, serve to rank them among the first in our list of economical plants." In a state of nature, the willow furnishes food by its leaves to the larvæ of moths, gnats, and certain other insects; and, by its flowers, to the honey-bee. Its wood, also, is preferred to most others by the beaver. The leaves and young shoots are wholesome and nourishing to cattle; and in some northern countries they are collected green, and then dried and stacked for that purpose. In France, those of *S. caprea*, whether in a green or dried state, are considered the very best food for cows and goats; and horses, in some places, are fed entirely on

in the garden of Mr. Crowe, where seedlings innumerable sprang up all over the ground, Sir J. E. Smith was not only confirmed in the immutability of his species, amounting to 64, as natives of Britain, but also, that new or hybrid species were not produced by the seeds of species growing together in the same garden. Both these conclusions are alike at variance with those of the most other botanists. As the result of this eminent botanist's study of the genus, he has arrayed his 64 species of British willows under three sections, characterised by the margins and surfaces of the leaves; viz. 1. serrated and smooth; 2. entire and smooth; and, 3. surface sluggy, woolly, or silky. Since the time of Sir J. E. Smith, the principal British student of willows is Mr. Borrer; and, in Sir W. J. Hooker's *British Flora*, this able botanist has arranged the British willows, increased in Sir W. J. Hooker's work to 71 species, under 18 sections. These sections are all natural; and each is characterised by the name of a typical species. This is obviously a very great improvement in the arrangement of this genus, whether these kinds are considered as chiefly species, or chiefly varieties; and to us it appears the best adapted for the present state of our knowledge of willows, till all the known kinds shall have been studied for a number of years in one garden.

Among the Continental botanists, the late Dr. Host of Vienna, and Professor Koch of Erlangen, appear to be the principal students of willows. Dr. Host, in the preface to his *Salix*, seems disposed to consider the kinds of willow that exhibit the same appearances when under the same circumstances of soil and situation as distinct species; and he has described no fewer than 60 of these as natives of Austria. He admits the extreme difficulty of determining what are species in many cases, from the different localities in which the same species is sometimes found. For example, willows which inhabit low moist situations in valleys flower only in the spring; while those which inhabit mountains do not flower till after the melting of the snow, which sel-

1486

dom happens before the beginning of summer. On the other hand, very many sorts, in intermediate localities, are intermediate also in their time of flowering. Hence, the same kind, when it inhabits three different regions, cannot be compared together in the same stage of growth in a living state; and, consequently, three species may, in this way, be made out of one. Dr. Host further observes, that a great impediment to the determining of what are really species, arises from the sexes of a species often inhabiting localities very distant from each other, and sometimes even different regions; and the beautiful figures which illustrate this author's work, on the supposition that they are faithful portraits, clearly show that the male and female differ very considerably in their foliage and wood, independently altogether of their catkins.

The great master in the genus *Salix* may be considered Professor Koch, who has done more to advance a knowledge of this genus in his 12mo pamphlet of 69 pages, *De Salicibus Europæis Commentatio*, published in 1828, than the most voluminous of ancient or modern authors. The preface to this pamphlet is so full of instruction as to the mode of studying this family of plants, that we are confident that our readers will feel obliged to us for presenting to them the following

Abstract of Koch's Preface to his Commentary on the Genus Salix. The author, after noticing the difficulties to be encountered in this genus, and referring to what has been done by Linnæus, Wahlenberg, Willdenow, Smith, and others, notices the 119 species which had been sent to him by Schleicher, as found by that botanist in Switzerland, and thus, as we have before observed (p. 1436.), making the total number of species of *Salix* 254. Of Schleicher's species, he says that he could not find one that truly deserved the name. They are, he adds, mere variations of species long since known; and, for the most part, different forms of one changeable species, viz., his own *S. phyticifolia*. All

them, from the end of August till November. Horses so fed, it is stated, will travel 20 leagues a day without being fatigued. (*Bosc.*) In the north of Sweden and Norway, and in Lapland, the inner bark is kiln-dried and ground for the purpose of mixing with oatmeal in years of scarcity. In a rude state of civilisation, the twigs of the willow were used in constructing houses, household utensils, panniers, the harness of horses and cattle, and for various purposes connected with boats and fishing. The twigs are still very generally applied, in Russia and Sweden, to all these uses; and Dr. Walker relates that he has ridden in the Hebrides with a bridle made of twisted willow twigs, and lain all night at anchor with a cable made of the same material. The bark of the trunks of young trees is used generally, throughout the north of Europe, for the same purposes as that of the linc tree (See p. 368.); and in Tartary, it is said, it is macerated, and the fibre, when separated, spun into threads, from which cloth is woven.

1484

The Study of the Species. The genus *Salix* has been a stumbling block to botanists from the time of Linnæus, who observes that so great are the changes effected on the kinds by soil, situation, and climate, that it is difficult to determine whether many of the differences should constitute species, or varieties only. He recommends rejecting the old names and characters, and describing anew the several species accurately, as seen in their natural places of growth. For this purpose, he gives directions for observing the development of the buds, the situation of the catkins, the form and other circum-

1485

stances of the leaves, the number of stamens, and whether the plants are trees, shrubs, or creepers. With due deference to the opinion thus expressed by the great father of scientific botany, we think that the study of willows, or of any other species of plant, in its native habitat is by no means a good mode for determining what are species, and what are varieties; but rather likely, on account of the great difference of habitats, to increase the number of both; since every difference may be considered specific relatively to the circumstances which produce that difference. It appears to us that it would be a better mode to collect plants of the particular genus to be studied from all the different habitats in which they are to be found, and to cultivate and study them in the same garden, where they would be all subjected to the same exterior influences. What Sir J. E. Smith says on this subject does not appear to us much more satisfactory than the advice of Linnæus. "Willows," he says, "should be particularly studied at three different seasons: the flowering time; the early part of summer, when the young shoots, with their stipules and expanding foliage, are to be observed; and, finally, when the leaves are come to their full size. No botanist, therefore, can be competent to form an opinion about them, unless he resides among the wild ones, for several seasons, or continually observes them in a garden. No hasty traveller over a country, no collector of dried specimens, or compiler of descriptions, can judge of their characters or essential differences. One principle, above all, in this department of botany, and indeed in every other, cannot be too strictly enforced. We should study a species before we decide on its characters, and not lay down rules of definition beforehand. In many plants, the differences of simple or compound, entire, serrated, or jagged, leaves; the presence or absence of stipules; though usually so essential and decisive, make no specific distinction at all. In some tribes or genera, one part affords the best specific character, in others some different part. The distinctions of willows are frequently so very nice, that the greatest observation and experience only can stamp them with due authority." (*Eng. Fl.*, iv. p. 165.) After thirty years' study of every kind of willow that could be procured in any part of Britain,

Schleicher's kinds are enumerated as species in Stendel's *Nomenclator*; but Koch treats them as spurious, he recognising not more than 50 truly distinct European species.

1489

From the perusal of Koch's observations, two points, we think, will be rendered clear to the botanical reader:—1. That the mode of arranging the sections according to the character of the leaves, adopted by all the Linnean school previously to the time of Wahlenberg, is altogether defective; and, 2. That the system of throwing the species into natural groups, as adopted by Wahlenberg, Fries, Koch, and Borrer, is the true one. Being ourselves of this opinion, the only question that remained for us to decide was, whether we should follow Koch or Borrer in the arrangement of the species described in this work as in a living state in British gardens.

The excellence of Koch's system was strongly impressed on our mind from the moment that we saw it developed in Dr. Lindley's *Synopsis of the British Flora*; and, if we could have classed all the numerous sorts of willows in the salicetum at Woburn, and in the Hackney arboretum, under Koch's ten groups, in a manner satisfactory to ourselves, we should have done so; the more especially as, from observing with care all the different sorts in the Hackney arboretum, at different periods, from March to December, 1836, we felt convinced in our own mind that by far the greater number of them were varieties, and chiefly of *S. caprea* L. Not being able to do this, we determined on endeavouring to obtain the advice and assistance of the first authority in Britain on the subject of willows; and we accordingly applied to Mr. Borrer, who at once, in the most kind and liberal manner, classed the sorts contained in the *Salicetum Woburnense* in the 22 groups into which, with the exception of a few sorts, they are thrown in the following article. Mr. Borrer's knowledge of this genus is universally known. He possesses an extensive collection of living plants, which he has cultivated for some years; and, as Sir W. J. Hooker remarks, "No one has ever studied the willows, whether in a growing or a dried state, more deeply, or with a less prejudiced mind." (*Brit. Fl.*, ed. 3, vol. i. p. 416.)

CHAP. CIV. BETULACEÆ. BETULA.

1496

The wood of the birch is white, shaded with red; of a medium durability in temperate climates, but lasting a long time when it is grown in the extreme north. The grain of the wood is intermediate between coarse and fine. It is easily worked while it is green; but it chips under the tool when dry. It weighs, when green, 65 lb. 6 oz.; half-dry, 56 lb. 6 oz.; and dry, 45 lb. 1 oz. The wood of old birch trees is harder than that of young trees, and it also weighs considerably more: for it appears, by the experiments of Hartig, that the wood of a tree of 60 years' growth, weighed, dry, 36 lb. 13 oz.; while that of a tree of 25 years' growth, in the same state of dryness, only weighed 35 lb. 5 oz. The wood soon rots when laid on the ground in heaps; and, therefore, immediately after the trees are felled, they ought to be drawn out of the wood, and taken into the timber-yard, where they can be exposed freely to the air. As fuel, birch wood occupies the 12th place among 21 different sorts; and is to the fuel of the beech as 13 is to 15: but, if the wood of the birch is to be compared with that of the beech, taken in the bulk, it is only as 12 to 15: because birch logs, not being so straight as those of the beech, do not pack so closely together. The wood gives a clear, bright, and ardent flame, and affords the kind of fuel most generally used in Sweden,

Russia, and France, for smelting-furnaces. Its charcoal remains burning a long time; though, compared with that of the beech, its value is only as 14½ to 16. The bark of the birch is remarkable for its durability, remaining uncorrupted for ages, even in situations exposed alternately to air and water, cold and moisture. Pallas refers, in proof of this, to the tombs near Jenisea, in Siberia; and to the vaults under the Kremlin, in Moscow. When Maupertuis travelled through Lapland, "to measure a degree of latitude, he was obliged to pass through vast forests, consisting entirely of birch. The soil, in some parts of these wastes, being very shallow, or very loose, the trees had

1697

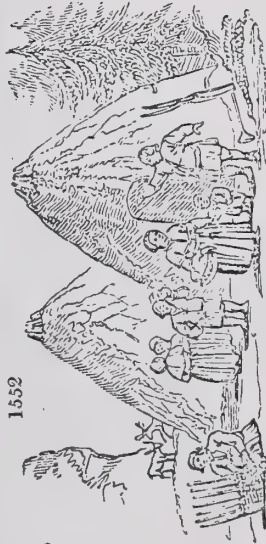
not a sufficient footing for their roots, and became an easy prey to winds. In these places, Maupertuis found as many trees blown down as standing. He examined several of them, and was surprised to see that, in such as had lain long, the substance of the wood was entirely gone, but the bark remained a hollow trunk, without any signs of decay." (*Gilpin's Forest Scenery*, vol. i. p. 71.) In the mines of Dworetzkoï, in Siberia, a piece of birch wood was found changed entirely into stone; while the epidermis of the bark, of a satiny whiteness, and shining, was exactly in its natural state, perfectly well preserved, and without being coloured by the iron. It would be difficult, says the relator of this fact in the *Nouvau Du Hame*, to find a more striking proof of the durability of this thin pellicle, so light and so delicate in appearance, and which the ancients used with so much propriety instead of paper, before the invention of that material. The birds and leaves, in early spring, abound in a resinous matter, an aromatic and agreeable fragrance from which may be perceived at a considerable distance from the tree; and the leaves, when bruised, whether in a recent or dried state, are also bitter and aromatic. The wood is employed by wheelwrights, in France, for the felloes of wheels; and, in the interior of Russia, in the construction of small rustic carriages: the felloes of the wheels are sometimes made of one entire stem of a young birch tree, bent by heat, and retained in its place by ties of the spray. On the Continent, chairs, and many kinds of furniture, are made of birch wood; and many articles of cooperage, turnery, &c. Sabots are also made of it; but they are not so good as those made of alder, and several other kinds of wood, admitting the water when they grow old. For cabinet-making, the birch is of little use till it has attained the age of sixty or eighty years; at which age it is little liable to warp, or to be attacked by worms. The tree occasionally produces knots of a reddish tinge, marbled, light, and solid, but not fibrous; and of these, which are much sought after by turners, cups and bowls are made by the Laplanders with their knives. The young shoots and branches make hoops, brooms or besoms, and ties for faggots, baskets, wicker hurdles, and other purposes to which the hazel or the basket-willow is applied; and, when peeled, are used for making whisks for frothing up syllabubs, creams, and chocolate. Birch hoops are very durable, from the conservative influence of the bark.

In Poland, Russia, Sweden, Norway, and Lapland, small bundles of the twigs, which have been gathered in summer, and dried with the leaves on, are used in the vapour-baths, by the bathers, for beating one another's backs, in order to promote perspiration. The inhabitants of the Alps make torches of the branches; and the Highlanders, candles of the bark, twisted into a rope-like form. Sandals are also made of it, and thin pieces of the epidermis are placed between the soles of shoes, or in the crown of the hat, as a defence against humidity. The bark is used as coping to walls, and is placed over the masonry of vaults under ground, as lead is in England, to prevent the moisture from the soil from penetrating through it. It is even wrapped round sills and the lower parts of posts, and other pieces of wood inserted in the ground, or

resting on it, to preserve them from decay. The charcoal of the birch is much in demand for making gunpowder, and for crayons. The leaves are bitter to the taste, and not willingly eaten by any animals, except rabbits and goats; but, when they are young and fresh, they may be given to cattle and sheep; and they are dried for this purpose throughout a great part of Sweden, Norway, and Lapland. Medicinally, the leaves are said to be resolvent and detersive; and it is added, that persons afflicted with rheumatism, sleeping on a bed stuffed with birch leaves, experience a perspiration which affords them great relief. A yellow colour is obtained from them, which is used for painting in distemper, and for dyeing wool. The buds and the catkins afford a kind of wax, analogous to that of bees. The ashes are rich in potash: 1000 lb. weight of wood, burnt green, will give 10 lb. 12 oz. of ashes, which will afford 1 lb. 4 oz. of potash. In this respect, the birch occupies the 55th place in a list of 73 trees. In the birch, as in all other trees, the potash is most abundant in the bark; and, consequently, the spray always yields more in proportion than the trunk. The bark is much employed for tanning leather, both in Britain and on the Continent. The birch appears to have been first used in England for this purpose in Evelyn's time, as he speaks of "Mr. Howard's new tan, made of the tops and loppings of birch." The bark yields a yellowish brown dye, and, combined with alum, a brownish red. These may be considered as the principal uses of the birch tree in central Europe; but there are others to be noticed, which are peculiar to Norway, Lapland, Russia, and the Highlands of Scotland.

1698

In Lapland and Kamtschatka, the huts are constructed with birch branches covered with turf; and faggots of the spray with the leaves on, in cases formed of the skins of reindeer, serve for seats during the day, and beds at night. An interesting view of some of these huts is given by Dr. Clarke in his *Scandinavia*, of which our fig. 1552. is a copy. The bark of large trees, cut into lengths of 3 ft., and about 18 in. or 2 ft. broad, serves the Laplanders as a species of cape, or cloak, a hole being made it, in the centre, to admit the head. Sometimes several pieces are used, with the holes only at one end; and these, put over the head, and hanging down on every side, form as complete a protection from perpendicular rains or snows as if the man were slated. The same people, and also the Russians, make the bark of the smaller trees into boots and shoes; the legs of the boots being taken from trees about the same thickness as the human legs, and consequently, having no seam. The bark is also made into baskets, boxes, mats, and cordage for harnessing horses and reindeer, and the inner bark into thread; while all the fragments are carefully preserved for lighting fires, or twisting into candles. Reindeer skins are tanned by steeping them in a decoction of birch spray, mixed with salt; and woollen stuffs, being boiled in the same decoction, without the salt, are dyed yellow or yellowish brown, according to the length of time which the process is continued. The Finlanders use the dried leaves as tea. The bark is also extensively used, in Sweden and Norway, in roofing houses. The rafters are first



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covered with boards, on which plates of birch bark are laid in the same way as slates are in England; and the whole is covered with turf and earth, to the depth of 1 ft. or more, to exclude the heat in summer, and the cold in winter. The earth over the bark is sometimes cultivated; though it is most commonly kept under grass. Dr. Clarke mentions that, "on some of the roofs of the Norwegian cottages, after the hay was taken, he found lambs pasturing; and on one house he saw an excellent crop of turnips." (See *Encyc. of Agri.*, ed. 2, p. 111.) In Kamtschatka, the inner bark is dried and ground, like that of the Scotch pine, in order to mix it with oatmeal, in times of scarcity. It is also said to be eaten in small pieces along with the roe of fish. The sap of the birch is made into beer, wine, and vinegar; and a sugar is extracted, and a spirit distilled, from it: 240 bottles of sap give 6 lb. of syrup, which is used in Russia in that state as sugar, without being crystallised. During the siege of Hamburg by the Russians, in 1814, almost all the birch trees in the neighbourhood were destroyed by the Boshkirs, and other barbarian soldiers in the Russian service, by being tapped for their sap." (*Penny Cyclo.*, art. Bctula, vol. iv. p. 348.) The beer is produced by fermenting the sap with yeast, hot water, and hops, in the usual manner. The sugar is procured by boiling and evaporation; and the wine is made as follows:—

Birch Wine. The sap is first obtained by boring a hole, 1 in. or 2 in. deep, in each tree, near the ground, and on the south side of the trunk. In England, several holes are sometimes bored in the same tree at once; but, in France, this method is thought to deprive the tree of its sap too suddenly. Each hole should have a kind of fagot fixed in it, or end of this tube is placed in a vessel or large bladder, to reserve the sap. In some places, the collectors of the sap cut off the extremity of each branch, tying a bladder or vessel to the end of the wounded part. When a sufficient quantity of sap has been collected, the fagot, or the tree is stopped with a wooden peg; or the end of the wounded branch is covered with pitch. This operation is always performed in spring; and most sap is said to be procured after a very severe winter. Several trees should be bored at the same time, in order that a sufficient quantity of sap may be obtained in one day, as it is spoiled by being kept. It has been observed that the quantity of sap is in greatest abundance about noon. When the wine is to be made, the sap should be boiled with moist sugar or honey, in the proportion of four pounds of sugar to every gallon of liquor. While boiling, the scum is taken off as fast as it rises, till the liquor is quite clear. It is then worked with yeast in the usual way. The pure and mild nature of the liquor, and of a lemon, and of a lemon orange, may be added to every gallon of clear liquor, and will be found a great improvement. Some persons also put a few twigs of sweet briar into the cask when the wine is tunned, to give it a perfumed flavour; and anciently it was the custom to put cinnamon and other spices into it. In Moscow, they add dried sprigs of mint. The wine should be kept three months before it is bottled, and twelve months before it is drunk. Birch wine has an agreeable flavour, and is considered very wholesome. That made in Russia effervesces like champagne.

1699

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Birch Oil is obtained from the bark, by a kind of distillation, which is thus effected:—An excavation is made in the soil, on the side of a bank 10 ft. or 12 ft. deep, and in the form of an inverted cone, like a common limekiln, which is lined in the inside with turf. The bark, being collected, and placed in the kiln, is covered with turf, and then ignited; the oil flows through a hole made in the bottom of the kiln, into a vessel placed to receive it, from which it is transferred to casks for exportation. The liquor produced consists of oil and pyroligneous acid, and is used for tanning hides, to which it gives that powerful fragrance, so well known peculiar to Russia leather. The oil, when purified, is quite clear, and is used in medicine, both internally and externally; and the pyroligneous tar-like liquor, which is separated from it, is used for greasing wheels, and for other purposes.

In the Highlands of Scotland, Sang observes, birch may be said to be the universal wood. "The Highlanders make every thing of it: they build their houses of it; make their beds, chairs, tables, dishes, and spoons of it; construct their mills of it; make their carts, ploughs, harrows, gates, and fences of it; and even manufacture ropes of it." (*Pl. Kal.*, p. 80.) The branches are employed as fuel in the distillation of whisky; and they are found to contribute a flavour to that far superior to that produced by the use of fir-wood, coal, or peat. Birch spray is also used for smoking hams and herrings, for which last purpose it is preferred to every other kind of wood. The bark is used for tanning leather, dyeing yellow, making ropes, and sometimes, as in Lapland, instead of candles. The spray is used for thatching houses; and, dried in summer with the leaves on, it makes an excellent material for sleeping upon, where heath is scarce. The wood was formerly used in the Highlands for arrows; and the bark, it is said, on the sea coast, for making boats, as that of *B. papyracea* is in North America.

In addition to the above, we might enumerate a number of minor uses mentioned by authors, when speaking of the tree as belonging to the most northern parts of Europe; and some of which, we have reason to believe, are now become obsolete. Among these are what Evelyn calls "the whitest part of the old wood, found commonly in floating birches," from which, he says, is made "the ground of our effeminate-formed gallants' sweet powder;" and of the quite consumed and rotten wood," he says, is "gotten the best mould for the raising of divers seedlings of the best plants and flowers." (*Hunter's Evelyn*, vol. i. p. 224.) The use of the birch in artificial plantations, in Britain, is chiefly as an undergrowth, and as coppice-wood. In both cases, it is cut, every 5 or 6 years, for brooms, hoops, wattle-rods, cratware, &c.; every 10 or 12 years, for faggot-wood, poles, fencing, and bark for the tanners, the value of which, in Scotland, is about half that of oak bark; and not oftener than once in every 15 or 20 years, when it is wanted for herring casks. In all these cases, the spray is used for besoms, rods, ties, and similar purposes. In the Highland districts, standard trees are left to attain a timber size. The birch, as already observed, is very frequently used as a nurse to other trees; and especially to the oak, the chestnut, and other hard woods. Many of the extensive oak plantations made by the late Duke of Portland in Nottinghamshire were raised between rows of birch trees, planted two or three years before the acorns were sown; as has been recorded in detail by Speechnly, and by Hunter in his edition of Evelyn's *Sylva*, and in his *Georgical Essays*. Hedges are, also, frequently made of the birch in poor, mossy, or sandy soils; the tree bearing the shears as well as any ligneous plant whatever.

1714

The union of these properties renders the wood superior to that of all the other American birches. In Massachusetts, Connecticut, and New York, the wood of this birch is next in esteem to that of the wild cherry (*Cerasus virginiana*). Tables, bedsteads, arm-chairs, sofas, coach panels, shoe-lasts, and a great many other articles, are made of it. Hunter, in his notes to Evelyn's *Sylva*, vol. i. p. 219, says that the sap of this tree is used by the inhabitants of Kamtschatka without previous fermentation; and that the natives strip off the bark when it is green, cut it into long narrow strips, like vermicelli, and, after drying it, stew it with their caviare. Michaux strongly recommends the tree for cultivation, on a large scale, in the north of France, in England, and in Germany; and to the lovers of curious trees, "as eminently adapted, from the beauty of its foliage and the agreeable odour of its flowers, to figure in their parks and gardens."

1715

CHAP. CV.

OF THE HARDY LIGNEOUS PLANTS OF THE ORDER *CORYLACEÆ*,
OR *CUPULIFERÆ*.

Quercus Lin. Flowers unisexual; those of both sexes upon one plant. — Male flowers disposed in long, slender, pendulous catkins; the catkins in groups. Each flower consists of 8 or more stamens, and these are attended by 6—8 bractes, that are coherent at the base, and resemble a 6—8-part calyx. — Female flowers borne upon erect axillary peduncles; a few upon a peduncle. Each flower consists of a pistil, whose ovary, and the basal part of whose style, are invested with an adnate calyx, that is toothed at the tip; and the part of this that covers the ovary is again invested with involucreal scales, that are connate with external imbricate bracted ones.

gined in the different species. Whoever has seen an acorn of the common British oak would be at no loss to detect an oak of any species whatever, provided he saw its fruit; whereas in the case of many genera, such as *Pyrus*, for example, no man, not a botanist, who had seen an apple or a pear, would recognise as species of the same genus those trees which bore fruit like the mountain ash. In short, the genus *Quercus* may be as easily detected at first sight by its fruit, as the *Abietinæ* or the *Leguminosæ* are by theirs. The acorns of different species differ chiefly in the largeness or smallness, roughness or smoothness, of their calyx, or cup; and in their being sessile or stalked. In general, the oaks of Europe have stalked fruit, and the oaks of America sessile fruit. The fruit of most of the species attains maturity in one year; but in some two years are required. In all, the vital principle is but of short duration; and very few acorns, of any species, will germinate after having been kept a year. The rate of growth of the oak is, in most species, considered slow; though this is not the case when it is planted on suitable soil. The most rapid-growing European species is the *Q. Cériss*; and of the American species, in America, the *Q. álba*. The highest-growing species of oaks belong to the groups *Röbur*, *A'lbæ*, and *Cériss*; but full-grown trees belonging to these groups, which have reached 100 ft. in height, are rare. The general height of what are considered large British oaks varies from 60 ft. to 80 ft.; and large American oaks, from 70 ft. to 90 ft.

ARBORETUM ET FRUTICETUM BRITANNICUM;

IN EIGHT VOLUMES:

FOUR OF LETTERPRESS, ILLUSTRATED BY ABOVE 2500 ENGRAVINGS;
AND FOUR OF OCTAVO AND QUARTO PLATES.

VOL. IV.

FROM GARRAY'S, P. 2031., TO THE END.

SECOND EDITION.

LONDON:

PRINTED FOR THE AUTHOR;

AND SOLD BY

LONGMAN, BROWN, GREEN, AND LONGMANS,
PATERNOSTER-ROW.

1844.

a 1. M. GALE L.

The Sweet Gale, Sweet Willow, Candleberry Myrtle, or Dutch Myrtle.

Identification. Lin. Sp. Pl. 4, p. 745; Fl. Br. 1076; Eng. Bot. t. 562; H. Scot. t. 288; Fl. Dan. t. 37; Ehrh. Pl. Off. 339; N. Du. Ham. 2, p. 194; Eng. Fl. 4, p. 239; Hook. Br. Fl. p. 432; Lindl. Synop. p. 242; Mackay Fl. Hibern. p. 257; Lodd. Cat. ed. 1836.

Synonymes. *Gale* Rati Syn. 443; Bauh. Hist. 1, p. 2; *Elæagnus Card. Hist.* 212, *Lob. Ic.* 2, p. 116; *Myrtus brabantica Ger. Enac.* p. 1414; *Rhus myrtifolia belgica Bauh. Pin.* 444; *R. sylvestris altera Datch. Hist.* 110; *R. sylvestris Park. Theat.* p. 1451; *Myrica palustris Lam.*; *Gale*, *Pimento royal, Fr.*; *geminæ Wachs Strauch, Ger.*

Engraving. Eng. Bot. t. 562; Fl. Dan. t. 37; Hayne, t. 200; Lob. Ic. 2, p. 116. f.; N. Du. Ham. 2, t. 57; and our fig. 1966.

The Seeds. Both are in the arboretum of Messrs. Loddiges.

Spec. Char., &c. Leaves lanceolate, serrated; tapering and entire at the base. Scales of the catkins pointed. (*Smith.*) A deciduous aromatic shrub, which rises with many stems, from 2 ft. to 4 ft. high; dividing into several slender branches, which are covered with a ferruginous-coloured bark, sprinkled with white dots. The leaves are alternate, on short footstalks, obovate-lanceolate, tapering and serrated towards the point. They are rigid, smooth on both sides, and of a light or yellowish green, palest on the under side. They are covered with resinous dots, which emit a delightful fragrance when bruised. According to Sir W. J. Hooker, the whole "plant diffuses an agreeable smell:—

* Gale from the bog shall wait Arabian balm." Brit. Flor., ed. 2., p. 432.



1966

2057

Plantarum called it *Gale*; Carduus and L'Obel, *Elæagnus*; and Dalechamp and Parkinson, *Rhus*; the latter supposing it to be the *Rhus sylvestris*, or wild sumach, of Pliny; while the Danish professor, Simon Pauli, asserted it to be the same as the Chinese tea tree. According to Gerard, this plant, in his time, grew so abundantly in the Isle of Ely, that the inhabitants made faggots of it (which they called goule sheaves) to heat their ovens. In more modern times, the twigs are laid by country people among clothes, to give them an agreeable smell, and to keep away the moths. The Welsh lay branches on their beds to keep off the fleas. The plant is also used, both in Wales and Sweden, to dye wool yellow, and to tan calf-skins. The leaves are bitter, and are sometimes used instead of hops in brewing beer; but, unless boiled a long time, they are reported to give a headache. A strong decoction of the leaves and twigs is used, in Sweden, to destroy bugs; and both the Highlanders and the Welsh give an infusion of the leaves to children, to kill worms. In Scotland, the inhabitants stuff beds with the leaves.



The berries are put in beer, in the same manner as those of *Cocculus indicus*, to make it heady and intoxicating; and, when dry, they are used, at St. Léger, in the neighbourhood of Paris, as spice. In a fresh state, they yield an essential oil by distillation. Linnaeus states that the catkins, when boiled, will throw up a scum like wax. The gale is the badge of the Highland clan Campbell. A variety with larger leaves, &c., is mentioned by Mirbel, and a figure of it given in the *Mém. Mus.*, 14, p. 474. t. 28., of which our fig. 1967, is a reduced copy.

1967

The bark of the *Abietinæ* is thin in young trees; and, in some species of *Abies* and *Picea*, even in old trees, it is never either very thick, or very rough. In many species of *Pinus*, on the contrary, it becomes very thick, rigid, cracked, and deeply furrowed in old trees, from the trunks of which it may be cut in large plates.

The wood is chiefly composed of parallel fibres, arranged in a manner somewhat intermediate between that of dicotyledonous and monocotyledonous trees; and, in consequence of these fibres not being very close, the wood is elastic and resilient. Being resinous, it is also, in general, very durable, and of great combustibility. Michaux remarks that "the branches of resinous trees consist almost wholly of wood of which the organisation is even more perfect than it is in the body of the tree, and that the reverse is the case with trees having deciduous leaves. As soon as vegetation ceases in any part of the tree, the consistence of the wood speedily changes; the sap decays; and the heart, already impregnated with resinous juice, becomes charged to such a degree as to double its weight in a year. The accumulation is said to be much greater after 4 or 5 years; the general fact may be proved by comparing the wood of trees recently felled, with that of others long since dead." (*N. Amer. Syl.*, iii. p. 143.)

2109

PINES AND FIRS

The flowers are disposed in catkins: they are unisexual, and those of the male are totally different from those of the female. In most species, both male and female catkins are on the same tree; but in *Araucaria*, as far as that genus is known, they are supposed to be on different trees. The male flowers consist of a number of stamens without any floral envelope, but simply accompanied by scales; and are much more numerous than the females, as is generally the case in unisexual plants. The pollen from the anthers of most species, when ripe, drops on the lower branches in such abundance as to change their colour from green to yellow; and both in the Highlands of Scotland, according to Lightfoot; and in the Vosges, in the north-east of France, according to Loiseleur Deslongchamps, it has been carried to a distance by wind, and has fallen on the ground like a shower of sulphur, to the great terror of the superstitious. The female flowers consist of a pistil, or stigma, enclosed in a simple perianth, or calyx, and accompanied by an involucre composed of one, two, or of several scales. There are in most genera two scales to each flower; an exterior one, which is large and thick, and forms the outer surface of the pine and fir cones; and an interior one, which springs from the base of the other, and is thin; and which protects two flowers, that afterwards become two seeds.

The fruit of the *Abietinæ* are all cones, which vary somewhat in form, though they are in general, as the word implies, conical; and they differ in size, from that of *Abies canadensis*, which is about half an inch in length, to that of *Pinus Lambertiana*, which has been found 2 ft. long. The cones which are thickest in proportion to their length are those of *P. Pinæ*, *Cedrus*, and *Araucaria*; that of the latter being almost spherical.

The largest seeds are those of the *Pinus Pinæ*; and the smallest those of some species of *Abies*. The seeds consist of albumen, composed of farinaceous matter, impregnated with resin and oil; in which the embryo is embedded. This oil has an acrid taste; but, as it can be removed by roasting, the farinaceous matter which remains may then be eaten like that of other seeds and roots. Hence all the seeds of the *Abietinæ* may be considered not only as edible, but as highly nutritive.

When the trees are found, they are cut down with hatchets, and the head and branches lopped off. The trunk is then stripped of its bark, and a circular notch is cut round the narrow end of it, in which to fix the rope by which the horses are to drag the trunk along; and a hole is made at the other end for a handspike, to steer the log over the many obstacles which lie in its way. Many of these trees are 70 ft. in length, and of proportionate diameter; and they are drawn by from 5 to 9 horses each, "yoked in a straight line one before another, as the intricate narrow paths in the wood will not permit of their going in any other way. One man mounts upon the leading horse, and another upon the middle one, while others support and guide with handspikes the large and distant end of the tree, to raise it over the elevations of the snow, and make it glide smoothly along. The conveyance of these large trees, the long line of the horses, and the number of boors accompanying them through the forests, and across the fields of snow, present an appearance very interesting." (*Houison in Ed. Phil. Jour.*, xii. p. 65.) In many cases, the trees are brought above 1000 versts (nearly 1000 English miles) before they are delivered to the merchant; and they generally remain under his care "another winter, to be shaped and fitted for exportation, in such a manner as to take up as little room as possible on shipboard," so that the Russian timber does not reach the foreign consumer till two years after it is cut down. When the trees are delivered to the merchant they are carefully examined by him, and the nobleman, or his overseer, to ascertain their soundness; and, for this purpose, a hatchet is struck several times against them, and by the sound arising from the strokes they judge of the soundness of the tree. The trees rejected, which are called *brusake*, are in the proportion of 1 in 10. The trunks are formed into rafts, and floated down the rivers by the current; but on the lakes they are propelled by sails or paddles, or, where practicable, by horses; the boors who guide the raft, living in a wooden hut constructed on it. Most of the pine timber sent to Petersburg, lies beyond the Biel Ozer, or White Lake, the waters of which, and of the Onega Lake, it has to traverse, besides passing down several rivers, before it reaches Petersburg. "Across these great lakes, resembling seas in extent, the navigation is at times difficult and dangerous. Storms and sudden gales of wind frequently occur, driving the vessels and timber rafts from the sides into the middle of the lakes, out of sight of land, and often proving destructive to them and to their crews." In order to prevent such accidents, Peter the Great began the Ladoga Canal, along which the rafts are conveyed with perfect safety, to the river Neva, the stream of which carries them down to Petersburg, where they remain in the timber-yard of the merchant till they are ready to be floated down to Cronstadt for foreign exportation." (*Ibid.*, p. 70.)

In Germany there are extensive forests of pine and fir trees; and the following description of the rafts of timber on the Rhine will give an idea of the mode by which these trees are conveyed down that river to the sea:—"A little below Andernach, the village of Narneddy appears on the left bank, under a wooded mountain. The Rhine here forms a little bay, where the pilots are accustomed to unite together the small rafts of timber floated down the tributary rivers into the Rhine, and to construct enormous floats, which are navigated to Dortrecht (Dort), and there sold. These machines have the appearance of floating villages, each composed of twelve or fifteen little wooden huts, on a large platform of oak and deal timber. They

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are frequently 800 ft. or 900 ft. long, and 60 ft. or 70 ft. in breadth. The rowers and workmen sometimes amount to 700 or 800, superintended by pilots, and a proprietor, whose habitation is superior in size and elegance to the rest. The raft is composed of several layers of trees, placed one on

another, and tied together: a large raft draws not less than 6 ft. or 7 ft. of water. Several smaller rafts are attached to the large one, besides a string of boats, loaded with anchors and cables, and used for the purposes of sounding the river, and going on shore." (*An Autumn near the Rhine.*) Every article of provision for the workmen is carried on board these rafts, together with live pigs, poultry, &c.

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In North America, both in the United States and Canada, are the most extensive pine forests in the world; and the most gigantic specimens of *Abietina* that are known to exist, some of the firs found by Douglas in California growing to the height of from 150 ft. to 200 ft. In Canada, from the summit of the ridge extending from the shores of Labrador westward across the country to the marshes near Lake Winnipeg, and on the south side of the great estuary of the St. Lawrence, as far as the boundary of the United States, the land, before it began to be cleared by the European settlers, was covered with one immense forest of pines and firs; and on the south of the St. Lawrence, the forest reached down to the water's edge along the whole shore, and even covered the islands. The Canadian timber sent to England is principally from New Brunswick; and in 1824 it amounted in value to half a million sterling. The following account of the mode of cutting the timber in the back woods of Canada is abridged from M'Gregor's *Sketches of the Maritime Colonies of British America*, published in 1828. Several persons form themselves into what is called "a lumbering party," under the command of a "master lumberer," who manages the whole. The necessary supplies of provisions, clothing, &c., are generally supplied on credit by merchants, who are to receive payment out of the stock of timbersent down the rivers the following summer. The people then proceed into the woods, and select a place for their encampment near a stream of water; here

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they build a log hut, forming a pit or cellar below it to preserve those things which are liable to be injured by the frost. The cold is so intense that they are obliged to keep up a constant fire night and day, and they drink enormous quantities of rum, generally without water. When they work, they divide into three gangs: one of which cuts down the trees, another hews them, and the third is employed with oxen in dragging the logs to the nearest stream. Here they lie till the snow begins to dissolve in April or May, when "the rivers swell, or, according to the lumberers' phrase, 'the freshets come down.' At this time all the timber cut during winter is thrown into the water, and floated down till the river becomes sufficiently wide to make the whole into one or more rafts. The water at this period is exceedingly cold; yet for weeks the lumberers are in it from morning till night, and it is seldom less than a month or six weeks from the time that floating the timber down the streams commences, until the rafts are delivered to the merchants. No course of life can undermine the constitution more than that of a lumberer and raftsman. The winter snow and frost, although severe, are nothing to endure, in comparison with the extreme coldness of the snow water of the freshets; in which the lumberer is, day after day, wet up to the middle, and often immersed from head to foot." The lumberers of New Brunswick, and those who cut down timber in the United States, take great care to select trees of a proper size. Mr. M'Gregor states that not one tree in 10,000, in the woods, is fit for the purposes of commerce. In the United States the forests of pines and firs, when they occur on poor, dry, sandy plains, where broad-leaved trees will not grow, are called pine barrens, and they extend over a very considerable portion of the southern states, as far as North Carolina. "Upwards of 500 miles of our journey," says Captain Hall, "lay through these deso-

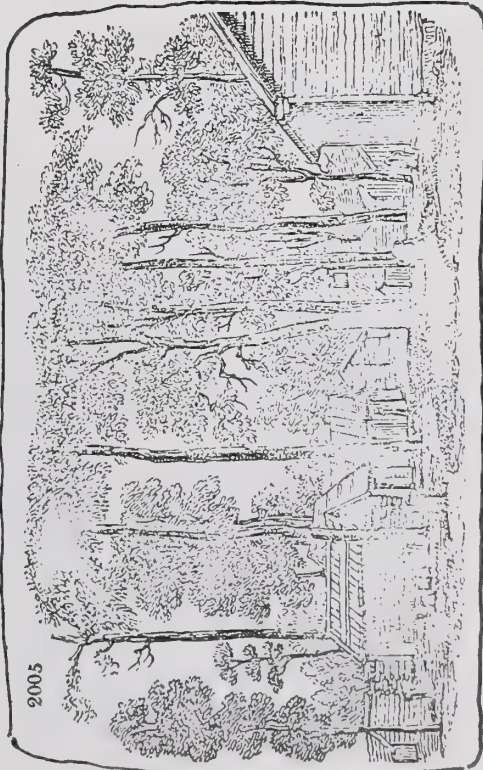
late forests, and I have therefore thought it worth while to give a sketch (fig. 2004.), which is sufficiently characteristic of these singular regions.

2004



Occasional villages (fig. 2005.) gave some relief to the tedium of this part of the journey, and whosoever a stream occurred, the fertility of the adjacent lands was more grateful to the eye than I can find words to describe. Once or twice, in travelling through the state of Georgia, we came to high knolls, from which we could look over the vast ocean of trees, stretching without a break in every direction as far as the eye could reach; and I remember upon one of these occasions, thinking that I had never before had a just conception of what the word forest meant." (Hall's *Sketches in Canada and the United States*, No. xxiii.) The pines in the United States which furnish timber for exportation are, according to F. A. Michaux, *P. mitis* (the yellow pine,) *P. strobus* (the white or Weymouth pine), and *P. australis* (the long-leaved pine.) Of these, the wood of *P. mitis* is called, in the English markets,

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2005

the New York pine, and it is sold at a lower price than that of *P. australis*, but higher than that of *P. strobus*. The long-leaved pine is the principal tree in the extensive pine barrens of the southern states. The timber of it is sent to England, principally from Savannah in Georgia, in planks called "ranging timbers," which are from 15 ft. to 30 ft. long, and 10 in. or 12 in. broad. At Liverpool it is called Georgia pitch pine, and is sold 25 or 30 per cent higher than any other pine imported from the United States. The timber of *P. strobus* is, however, that most generally imported into England from the United States; and the best is brought from the district of Maine, particularly from the banks of the river Kennebeck. The persons engaged in felling this timber are generally emigrants from New Hampshire.

"In the summer they unite in small companies, and traverse these vast solitudes in every direction, to ascertain the places in which the pines abound. After cutting the grass and converting it into hay for the nourishment of the cattle to be employed in their labour, they return home. In the beginning of winter they enter the forests again, establish themselves in huts covered with the bark of the canoe birch, or arbor vitæ; and, though the cold is so intense that the mercury sometimes remains for several weeks from 40° to 50° Fahr. below the freezing point, they persevere in their labour." (*Michx.* *North Amer. Syl.* iii. p. 167.) When the trees are felled they cut them into logs of from 14 ft. to 18 ft. long; and, by means of their cattle, drag them to the river, where they stamp them as a mark of property, and then roll them on its frozen surface, to remain till the breaking up of the ice enables them to float down the current. All the logs that come down the Kennebeck are stopped at Winslow, 120 miles from the sea; where each person selects his own, and forms them into rafts with the intention of selling them to the proprietors of the numerous saw mills between that place and the sea; or of having them sawn into planks for his own benefit, at the price of half, or even three quarters of the product in abundant years. The logs that are not sawn the first year, adds Michaux, are attacked by large worms, which form holes about 2 lines in diameter, in every direction; but, if stripped of their bark, they will remain uninjured for thirty years. The district of Maine furnishes three fourths of all the white pine exported from the United States, including what is brought from New Hampshire, by the Merimack, to Boston. That cut on the shores of Lake Champlain is carried to Quebec by the Sorel and the St. Lawrence.

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Ceres bore a flaming pine tree, plucked from Mount Etna, in each hand, during her search for her daughter Proserpine; and that Cybele, when her favourite Atys was about to destroy himself, changed him into a pine tree, and hence that tree was considered sacred to Cybele. He adds that a grove of sacred pines was among the trees moved by the music of Orpheus. Ovid also gives us the history of Sciron, or Cercyon, the pine-bender, a notorious robber, whose habit was, when he had taken a prisoner, to bend two pine trees, and to tie one of the prisoner's hands to each, and then to let the trees fly back, when the unfortunate traveller was torn asunder. This cruel monster was destroyed by Theseus. Virgil tells us that the ships of Æneas, which were afterwards changed into nymphs, were made of pine trees sacred to Cybele. He also alludes to the mournful sounds produced among the pine branches by the wind, and calls them the singing pines:

"The pines of Menalus were heard to mourn,
And sounds of woe along the groves were borne."

The cones of the pine were sometimes sacrificed to Bacchus, because they were put into wine to give it a flavour; and sometimes to Esculapius, because their odour, being balsamic, was thought excellent for asthma.

The pine tree is frequently mentioned by the elder British poets, prin-

cipally as affording a comparison for tall and stately beauty, or for dark and gloomy grandeur. One of the finest allusions to the pine is by Milton, in his splendid description of Satan, in the first book of the *Paradise Lost*:—

"His spear, to equal which the tallest pine,
Hewn on Norwegian hills, to be the mast
Of some great ammiral, were but a wand."

Milton also says:—

"His praise, ye winds, that from four quarters blow,
Breathe soft or loud; and wave your tops, ye pines,
With every plant, in sign of worship wave."

Among the more modern poets, perhaps the most beautiful lines relating to the pine are those of Barry Cornwall. Speaking of Polyphemus, he says,—

— "Mighty tears then fill'd
His solitary eye,—and with such noise
As the rough winds of autumn made when they
Pass o'er forest, and bend down the pines,
The giant sigh'd."

Death of Actis.

— "Here dark trees
Funereal (cypress, yew, and shadowy pine
And spicy cedar) clustered; and at night
Shook from their melancholy branches sounds
And sighs like death."

Ibid.

Leigh Hunt has also some beautiful lines on the pine tree:—

"And then there fled by me a rush of air
That stirred up all the other foliage there,
Filling the solitude with panting tongues;
At which the pines woke up into their songs,
Shaking their cloral locks."

HUNT'S *Foliage*: *Evergreens*, p. 94.

"And 'midst the flowers, turf'd round beneath the shade
Of circling pines, a babbling fountain play'd;
And 'twixt the shafts you saw the water bright,
Which through the darksome tops glimmer'd with showering light."

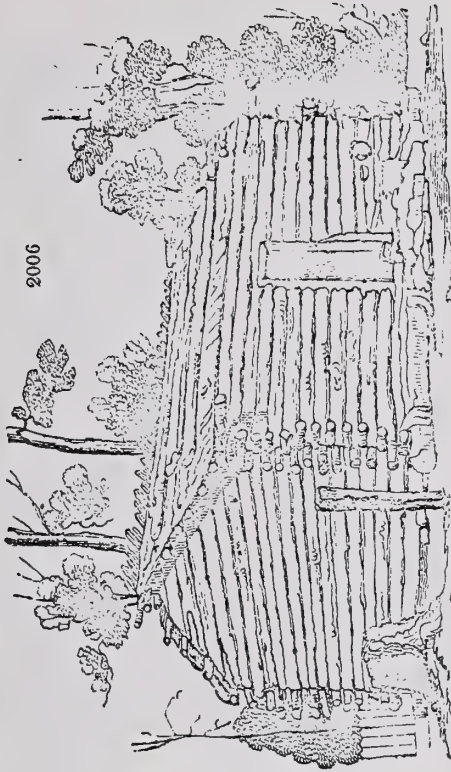
Story of Rimini, canto iii.

Shelly thus describes one of the conflagrations in the Norway forests:—

"As the Norway woodman quells,
In the depth of piny dells,
One light flame among the brakes,
While the boundless forest shakes,
And its mighty trunks are torn
By the fire thus lowly born;
The spark beneath his feet is dead;
He starts to see the flame it fed,
Howling through the darken'd sky
With myriad tongues, victoriously."

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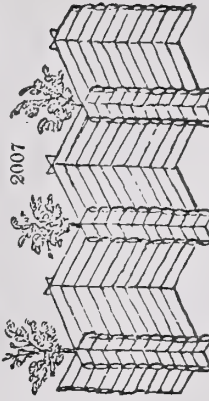
Properties and Uses. The native forests of Abit̄ina are observed to be warmer in winter than those of any other evergreen tree in the same climate. They consequently afford excellent shelter for wild animals of every description, and one of the best substitutes for a house for man. In the north of Europe, this is more particularly applicable to the forests of spruce fir, which form so dense a covering as almost to exclude heat in summer, and cold in winter. The pine and fir tribe, in a living state, with the exception of the larch (that tree having tender foliage), afford food to but few insects; but the seeds are greedily devoured by the squirrel and other animals, and by some birds. In civilised society, the wood of the pine and fir tribe is in universal use, and forms one of the most important articles of European and American commerce. No other tree produces timber at once so long and so straight; and so light, and yet so strong and stiff; it is therefore peculiarly fitted for almost all the purposes of civil architecture, and for some peculiar uses in the construction of ships. Masts are every where made of it, where it can be pro-



2006

cured of sufficient size; and the yellow deal of Europe, which is produced by the *Pinus sylvestris*; the white deal of Norway, which is produced by the *Abies excelsa*; and the white pine wood of America, which is the *Pinus Strobus*, are used throughout the civilised world in building and fitting up houses, in the construction of machinery, in furniture, and for an endless number of purposes. Log-houses (see fig. 2006.) are more conveniently made of trunks of the pine and fir tribe than of any other tree, on account of their straightness, and the slight degree in which they taper.

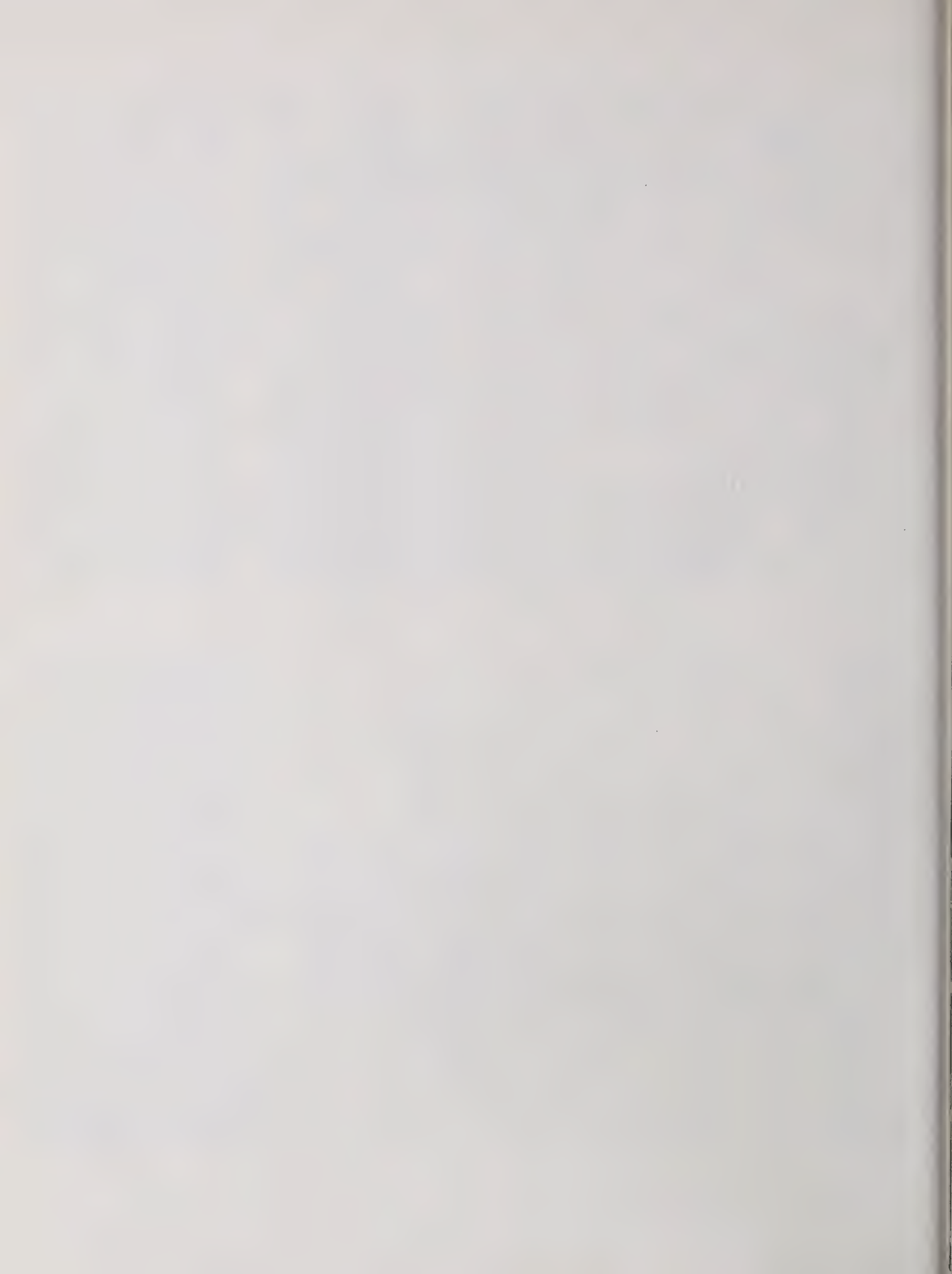
For the same reason, also, the worm fence of America (fig. 2007.), and the wooden fence of Sweden and Norway (fig. 2008.), are always made of pine or fir wood, when it can be obtained. In Russia, Poland, and other parts of the north of Europe, and also in the interior of North America, roads are formed over marshy ground by laying down the trunks of pine trees, side by side, and close together, across the line of road. In the latter country, these are called co duroy roads.



2007

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Accidents. With reference to the goodness and value of the timber, the most injurious accident that can befall a pine or fir tree is to have the dead stumps of the side branches left on, whether through neglect in artificial plantations, or from the trees not being sufficiently close together in natural ones. In such cases, the dead stump is buried under the living wood; and when the tree is sawn up into boards, every point where these stumps intersect the board forms a knot, which, if not glued in, generally drops out, leaving a hole through the board. The pine and fir tribe, from their resinous nature (resin being a powerful non-conductor), are said to be less liable to be struck by lightning than broad-leaved trees; and hence they are considered as particularly suitable for growing on mountains. (See Nuttall in *Gardener's Magazine*, vol. xiii. p. 351.) As, when standing singly, their spire tops do not oppose so large a surface to the wind as those of round-headed trees, and as their narrow leaves offer very little resistance, they are not



so liable to be blown down by high winds as might be imagined from their comparatively small roots; and they are still less so when associated together in dense masses of plantation or forest. As forests of the pine and fir tribe are generally situated on hills or mountains, and for the most part in climates where they are subject to be covered with snow for several months in the year, they are very liable to what may be called geological and meteorological accidents. In Switzerland, those movements of rocks, stones, and soil which take place in the mountainous districts, more or less every spring, and are called *éboulements*, often destroy several acres of pine forests at a time. In scattered forests, the snow falling on the trees individually is retained by their branches, and, when these are of great length, often weighs them down, and breaks them; while those movements of snow known by the name of *avalanches* are sometimes as injurious as the *éboulements*. We have seldom been more gratified with winter scenery, than when passing through a spruce fir forest in Sweden. We have seen trees of all ages grouped and distributed in innumerable ways; here weighed down with snow, and there boldly shooting through it their vivid green pyramidal heads. When a sudden thaw takes place in spring, the snow and the branches seem all in motion; some branches, being relieved from their load of snow, are rising up in consequence of their elasticity; and others, from the snow falling on them from branches still higher up the tree, are bending, and perhaps breaking, under the additional weight. In the pine and fir forests of Europe, a number of branches, and also of entire trees, are damaged in this way every year; but this is nothing to the havoc which takes place in America, during what is called an "ice storm." In the *Magazine of Natural History* (vol. vi. p. 100.), a very striking description of one of these storms at Philipsburg, near the Alleghany Mountains, is given by R. C.

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Taylor, Esq. A heavy fall of snow had been succeeded by a partial thaw and rain, followed by a severe frost, which enveloped "the trees and earth in a thick coating of transparent ice." The following morning, the accumulation of ice on the branches of the forest trees presented a beautiful and extraordinary spectacle. The noblest timbers were every where to be seen bending beneath the enormous load of ice with which their branches were incrustated, and the heavy icicles which thickly depended from every point; the thickness of the ice, even on the spray, often exceeding an inch. The smaller trees, from 20 ft. to even 50 ft. in height, were bent to the ground by this unwanted burden, and lay pressing on one another, resembling fields of gigantic corn, beaten down by a tempest. Above, the taller trees drooped and swung heavily; their branches glittering, as if formed of solid crystal; and, with the slightest breath of wind, clashing against each other, and sending down showers of ice. The following day, the limbs of the trees began to give way beneath their load. The leafy-spray of the hemlock spruce was thickly incased, and hung drooping round the trunks upon the long plant branches, until the trees appeared like solid masses or monumental pillars of ice. Every where around was heard the crashing of the branches of the loftiest trees of the forest, which fell to the earth with a noise like the breaking of glass, yet so loud as to make the woods resound. As the day advanced, instead of branches, whole trees began to fall; and, during twenty-four hours, the scene which took place was as sublime as can well be conceived. There was no wind perceptible, yet, notwithstanding the calmness of the day, the whole forest seemed in motion, falling, wasting, or crumbling, as it were, piecemeal. Crash succeeded to crash, until at length these became so rapidly continuous as to resemble the incessant discharges of artillery; gradually increasing, as from the irregular firing at intervals of the outposts, to the uninterrupted roar of a heavy cannonade. Pines of 150 ft. and 180 ft.

in height came thundering to the ground, carrying others before them. Under every tree was a rapidly accumulating debris of displaced limbs and branches; their weight increased more than tenfold by the ice, and crushing every thing in their fall with sudden and terrific violence. Altogether, this spectacle was one of indescribable grandeur. The roar, the cracking and rending, the thundering fall of the uprooted trees, the startling unusual sounds and sights produced by the descent of such masses of solid ice, and the suddenness of the crash when a neighbouring tree gave way, was awful in the extreme. Yet all this was going on in a dead calm, except, at intervals, a gentle air from the south-east slightly waved the topmost pines. Had the wind freshened, the destruction would have been still more appalling.

Another kind of accident to which pine forests appear particularly liable is their destruction by fire; and, in Siberia and in North America, immense tracts of pine forest are sometimes thus consumed. The fire generally originates with man, either purposely or by accident; but it is supposed sometimes also to be produced by the action of the sun upon the dry decayed wood of fallen trees; and sometimes, no doubt, it is the effect of lightning. In Captain Hall's *Sketches in Canada*, &c., he gives the following description of an American pine forest on fire:—"Sometimes the monotony of the pine barren was interrupted, in no very pleasant style, by the heat and smoke arising from the forest being on fire on both sides of us; though, as it happened, we were never exposed to any danger, or to serious inconvenience, in consequence of these conflagrations. The sketch (fig. 2011.) shows the forest in the predicament we have alluded to. The tree in the foreground had caught fire near the ground; and having, I do not know how, been hollowed out in its centre, the flames had crept up and burst out some feet higher, so that they were roaring like a blast furnace, and rapidly demolishing the tree at the bottom, while the branches at top were waving about in full verdure, as if nothing unusual was going on below." (Hall's *Sketches in Canada*, &c., No. 24.) McGregor informs us that in New Brunswick the forests are sometimes purposely set on fire by the settlers, to avoid the labour of cutting down the

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trees, and grubbing up their roots; but he adds that the practice is highly injudicious, as, by these indiscriminate conflagrations, the land is not properly cleared, and "a very strong and noxious plant, called the fireweed," springs up every where, and exhausts the fertility of the soil. The appearance of a burning forest is one of the most fearful and sublime objects that can be imagined, and has been powerfully described by Cooper in *The Pioneers*, and also by Galt in *Lamie Todd*. "The flames leap from tree to tree, and winding up to their tops, throw out immense volumes of fire from thick clouds of smoke, that hang over the burning mass, while the falling trees come down with most tremendous crash." The following account of one of these fires, which was more than usually destructive, is extracted from Mr. McGregor's book:—"In October, 1825, upwards of a hundred miles of the country, on the north side of the Miramichi river, became a scene of the most dreadful conflagration that has, perhaps, ever occurred in the history of the world. In Europe we can scarcely form a conception of the fury and rapidity with which the fires rage through the American forests during a dry hot season, at which time the underwood, decayed vegetable substances, fallen branches, bark, and withered trees, are as inflammable as a total absence of moisture can make them. When these tremendous fires are once in motion, or at least when the flames extend over a few miles of the forest, the surrounding air becomes highly rarefied, and the wind naturally increases it to a hurricane. It appears that the woods had been, on both sides of the north-west branch, partially on fire for some time, but not to an alarming extent until the 11th of October, when it came to blow furiously from the north-west, and the inhabitants on the banks of the river were suddenly alarmed by

a tremendous roaring in the woods, resembling the incessant rolling of thunder; while, at the same time, the atmosphere became thickly darkened with smoke. They had scarcely time to ascertain the cause of this phenomenon, before all the surrounding woods appeared in one vast blaze, the flames ascending more than 100 feet above the top of the loftiest tree; and the fire, like a gulf in flames, rolling forward with inconceivable celerity. In less than an hour Doughtstown and Newcastle were enveloped in one vast blaze, and many of the wretched inhabitants, unable to escape, perished in the midst of this terrible fire." (*Sketches of the Mar. Col. of British America*.) In some parts of Sweden, also, the pines and firs are purposely burnt, to clear the fields for agricultural purposes; but there are also extensive accidental fires. Dr. Clarke, describing his journey from Stockholm northward, says: "As we proceeded to Hamrange, we passed through noble avenues of trees, and saw some fine lakes on either side of the road. Some of the forests had been burned, by which the land was cleared for cultivation. The burning of a forest is a very common event in this country; but it is most frequent towards the north of the Gulf of Bothnia. Sometimes a considerable part of the horizon glazes with a fiery redness, owing to the conflagration of a whole district, which, for many leagues in extent, has been rendered a prey to the devouring flames." In Lapland, beyond Tornea, he adds, "some forests were on fire near the river, and had been burning for a considerable time." Mr. Tipping informed us that these fires were owing to the carelessness of the Laplanders and boatmen on the rivers, who, using the *Zolctus* (Polyporus) igniarius (German tinder) for kindling their tobacco-pipes (see p. 1834.), suffer it to fall in an ignited state among the dry leaves and moss. They also leave large fires burning in the midst of the woods, which they have kindled to drive away the mosquitoes from their cattle and from themselves; therefore, the conflagration of a forest, however extensively the flames may rage, is easily explained. Yet Linnæus, with all his knowledge of the country, and customs of the inhabitants, attributed the burning of forests in the north of Sweden to the effects of lightning. During these tremendous fires, the bears, wolves, and foxes, are driven from their retreats, and make terrible deprecations among the cattle." (*Travels*, &c.)

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first, to study the subject historically, that is, to ascertain what has been said of it in books; and, next, to study it practically, that is to compare the information and the plates given in books, with living plants. After perusing all the works we could procure on the subject, including Lambert's *Genus Pinus*, 2d edit., 2 vols, 8vo, and the third volume of that work (which, though only three or four copies have yet, August, 1837, been published, we have been very kindly favoured with the loan of by His Grace the Duke of Bedford), we took the first two volumes of Lambert's work, and that volume of Michaux's *North American Sylva* which contains the *Abietinæ* of North America, in our hands, and visited Loddiges's arboretum, the Horticultural Society's Garden, Kew, Syon House, Dropmore, Whitton, Pains Hill, Mill Hill, White Knights, and the principal nurseries; and, from the study of the plants in these places, in connexion with the descriptions and plates in the books we have mentioned, we have arrived at the general conclusions which we shall now shortly lay before the reader, as preliminary to giving each genus, and its species and varieties, in detail.

In every arrangement of species and varieties, it appears to us that there ought to be two objects in view. First, to throw all the kinds into groups capable of being more or less distinctly defined; or, at all events, of being represented by one species as a type; such, for example, as the group *Sylvestres*,

of the section *Bina*, which consists of species all more or less resembling the Scotch pine in foliage and in cones. The use of these groups is, to render the whole mass easily comprehended by any person who knows only a few of the species; and, secondly, when separating these groups into species and varieties, to give as prominent a place to all varieties and subvarieties that are truly distinct, as if they were species. Besides the argument which we have advanced in favour of throwing the kinds into groups, there are the important ones mentioned in Part II. of this work (p. 216.); viz. those of assisting a collector of trees to make a judicious selection, and of preventing a beginner in botanical studies from puzzling himself in finding out specific distinctions where none really exist. The reason why we wish to keep every variety and subvariety as distinct as possible is, that, in the practice of arboriculture, whether for useful or ornamental purposes, a variety is often of as much importance as a species, and sometimes, indeed, more so: for example, in *P. sylvestris*, the Highland variety is known and acknowledged to produce timber of a superior quality to the common kind; and, in point of ornament, for situations where the common kind of Scotch pine is too large, the species may be represented by *P. (s.) p. Mighus nana*, which forms a beautiful little bush.

In studying the *Abietinæ* from living trees, the terminal buds, the number of leaves in a bundle or sheath, and their position on the branch, the sheaths being persistent or deciduous, and the form of the cones, and the character of their scales, are the principal points by which, we think, one species or group of kinds can be distinguished from another. Thus, in *Pinus*, all the varieties of *P. sylvestris* have short-pointed resinous buds, differing less in this respect than they do in their cones, or in the length of their foliage. *P. Laricio* (which we consider as including a number of European and some Asiatic kinds, generally ranked as species, such as *P. taúrica*, *P. romána*, *P. calabrica*, *P. caramánica*, &c.) is distinguished by its long, sharply pointed, concave-sided, resinous buds; and *P. Pinaster* and *P. Pinea*, by their short, blunt, imbricated buds, which are never covered with resin. The buds of *P. Tæda* (which we consider to be the centre of a group of varieties generally treated as species, under the names of *P. rígida*, *P. variabilis*, *P. serotina*, &c.) are very small and resinous, and they are more numerous on the shoots than in any other species, either European or American. All the kinds belonging to *P. Tæda* have also the peculiar property of sending out numerous small abortive shoots from the dormant or adventitious buds in their trunks and larger branches, by which the trees may be known at a glance, even at a distance. All the tender kinds (such as *P. longifolia*, and its allied sorts, *P. leiophylla*, *P. canariensis*, &c.) have small obscure buds; and so on.

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the cones of all the varieties of *P. sylvestris* terminate in surfaces having more or less the appearance of a depressed pyramid; those of all the varieties of *P. Laricio* have a smooth lip, more or less protruding, and terminating in a depressed point; those of all the varieties of *P. Pinaster* terminate in a strong woody pyramidal point; and those of all the varieties of *P. Tæda* in a slender sharp prickle, turned upwards or downwards. The cones of different varieties of what we consider as the same species vary much in size; and, as these variously sized cones are generally reproduced from seed, the plants bearing them have been usually treated as distinct species. We do not, however, consider the fact of the seed of large-coned varieties producing plants bearing large cones, any more a proof that the kind is a species, than we do that of seedlings from the seeds of a large apple producing trees bearing large apples, a proof that the particular kind of apple is a species distinct from apple trees bearing small apples. The cones of *P. (s.) p. Mighus* are twice the size of those of *P. (s.) p. pumilio*; but in other respects the plants are hardly distinguishable. Perhaps we shall be told that the com-

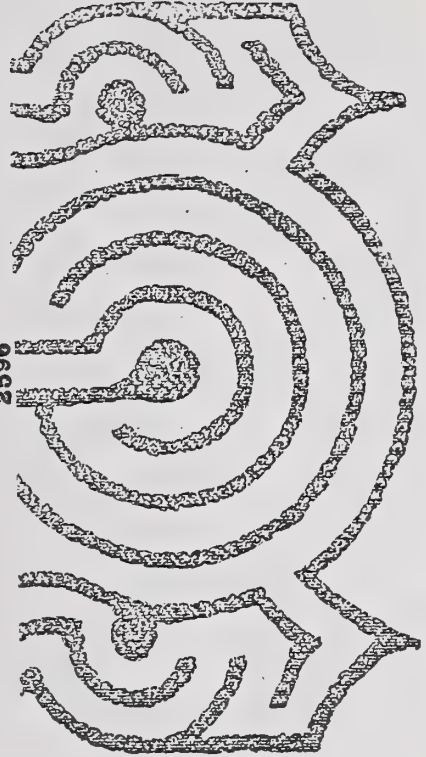
fresh, they will come up in a few days. In general, however, the freshness of the seeds may be ascertained by opening them; and, if the kernel is plump and fragrant, there can be little doubt of their germinating. In the *Dictionnaire des Eaux et Forêts*, it is said that, in France, the seeds of the spruce, which are of a reddish colour, are sometimes turned black by means of powdered charcoal, and sold for those of the wild pine; but nothing of this kind takes place in Britain, as the seeds of the latter species are of all the most abundant, and consequently the cheapest. The seeds should be sown in beds of light rich soil, and covered very slightly, perhaps from a sixteenth to a fourth of an inch, according to the soil, situation, and climate. Sowing directs the seeds to be sown so as to rise at the distance of a quarter of an inch from one another, and the covering to be $\frac{3}{4}$ in. thick. In France and Germany, forests of wild pine are frequently raised by sowing the seed where the plants are finally to remain; in which case an acre, where the soil and situation are favourable, will require 14 lb. of seeds with the wings on, and 11 lb. without the wings; and, where the soil and situation are unfavourable, 16 lb. with the wings, and 12 lb. without them. If the seeds are sown in rows, half the quantity will suffice in both cases. The time for sowing, whether in the nursery or in the forest, is from the end of March to the beginning of May; taking the climate of London for one extreme, and that of Aberdeen for the other.

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Many of these roots lie near the surface; and, as they abound very much with resinous matter, they readily catch fire. The fire seems to be propagated slowly, as in match paper; a gradual and stifled combustion creeps onwards, encouraged by the drought, and constantly fed by the empyreumatic oil of turpentine (or tar), which is produced by the heat, until the interior of the trunk itself be destroyed. (*Jameson's Journal*, iv. p. 207.) We have given these ample details on the subject of the Scotch pine, considering it by far the most valuable timber tree of the genus in Britain, and even in Europe.

Statistics. Recorded Trees. Gilpin mentions Basilsleigh, in Berkshire, as containing some of the most picturesque species of the Scotch pine in England in his time. He also mentions some fine trees at Thirkleby, near Thirsk, in Yorkshire, a few of which still exist.

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C. rostrata. - Page 2030., add, after "Boston:" "The nuts are so hard, that they are said to have been used by the inhabitants as shot."

parison between pine trees and apple trees is not a fair ground of argument; because the apple tree is in a state of culture, and far removed from its natural habits; but to this we answer, that the same effects as those produced by culture in the apple tree, are produced by a variety of geographical and physical circumstances in the pine tree; and of this the two above-named varieties of *P. sylvestris* may be cited as a proof.

The leaves of all the species of pines may be classed according to the number in a sheath; and this is a most convenient mode of determining the groups and even the species, in the case both of young plants, and of trees without cones. All the European species, with the exception of *P. Cembra*, have only 2 leaves in a sheath, and most of the Asiatic, Mexican, and Californian kinds have 3, 4, or 5 leaves; while those of the United States and Canada have, for the most part, 3. The leaves vary in length in different species; but much less so in the varieties of the same species than might be imagined. Thus, in all the varieties of *P. Laricio* the leaves are nearly double the length of those of *P. sylvestris*.

Pinus. In studying this genus, and arranging the kinds according to their buds, cones, and leaves, we consider *P. sylvestris*, *P. Laricio*, *P. Pinaster*, *P. Pinea*, *P. halepensis*, and *P. Cembra*, as the principle European species, and the other European kinds as only varieties of them. *P. australis*, *P. Taeda*, *P. Banksiana*, *P. inops*, *P. pungens*, and *P. Strobus*, we consider as the principal species of North America. *P. Sabiniana*, *P. ponderosa*, and *P. insignis* are the principal species of California. *P. Lambertiana* and *P. monticola* also from California, and *P. excelsa* from Nepal, appear to be only varieties of *P. Strobus*. The most remarkable species from Nepal is *P. Gerardiana*, which has straight stiff leaves like those of *P. Pinea*, but with caducous sheaths.

Abies is a genus of which there are so few species, that it is attended with no great difficulty. *A. rubra*, *A. nigra*, and *A. alba* are probably only different forms of one and the same species. *A. Smithiana* may possibly be a variety of *A. excelsa*, and *A. dumosa* of *A. canadensis*. *A. Douglasii* and *A. Menziesii* appear specifically distinct, but there are only very small plants of the latter in this country. One of the most remarkable species of *Abies*, from Cephalonia, which has lanceolate and sharp-pointed leaves, like those of an araucaria, has just (1837) been introduced.

Picea is a very easy genus; *P. balsamea*, *Fraseri*, and *P. picta* are probably only varieties of one species; and, though *P. Webbiana* has purple cones, we doubt whether it can be considered more distinct from *P. pectinata* than *Thia grandifolia* is from *T. parvifolia*. The colour of the cones in the *Abietinae* has no claim to be considered a specific distinction; because in all extensive woods of one species, such as of *P. sylvestris* and *Larix europæa* in Scotland, they will be found to vary considerably.

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Propagation and Culture. The Scotch pine produces cones at the age of fifteen or twenty years; and every cone generally contains from 60 to 100 seeds. The cones are gathered in the months of December and January, and laid in a dry loft, where they will keep good for a year or two, if not wanted for sowing; and whence they may be taken in early spring, and exposed to the sun, or at any season and slightly dried on a kiln, as already directed, p. 2131.

Eleven imperial gallons, or about a bushel and a half, of cones, will afford 1 lb. of seed with the wings on, or from 13 oz. to 14 oz. without wings. A bushel and a half of seeds, with the wings on, weigh 12 lb.; and without the wings, 26 lb. As might be expected, the seed keeps longest when the wings are left on. If kept in a dry place, and turned over occasionally, to prevent it from heating, the seed will keep fresh several years; but its vitality is very doubtful after the second year. Old seeds are easily proved by sowing a few in a pot, and placing it in heat in a moist atmosphere; when, if the seeds are

AN

ENCYCLOPÆDIA

OF

PLANTS;

COMPRISING

THE SPECIFIC CHARACTER, DESCRIPTION,

CULTURE, HISTORY, APPLICATION IN THE ARTS,

AND EVERY OTHER DESIRABLE PARTICULAR RESPECTING

ALL THE PLANTS

INDIGENOUS, CULTIVATED IN, OR INTRODUCED TO

BRITAIN:

COMBINING

MUCH OF THE INFORMATION CONTAINED IN A SPECIES PLANTARUM,

A *Historia Plantarum*, a *Grammar of Botany*,

AND A DICTIONARY OF BOTANY AND VEGETABLE CULTURE.

THE WHOLE IN ENGLISH;

WITH FIGURES OF NEARLY TEN THOUSAND SPECIES;

AND

SUPPLEMENTS

BRINGING DOWN THE WORK TO THE YEAR 1840.

EDITED BY J. C. LOUDON, F.L.S. H.S. &c.

THE SPECIFIC CHARACTERS BY AN EMINENT BOTANIST; *Linley*

THE DRAWINGS BY J. D. C. SOWERBY, F.L.S.;

AND THE ENGRAVINGS BY R. AND R. E. BRANSTON.

LONDON:

PRINTED FOR

LONGMAN, ORME, BROWN, GREEN, AND LONGMANS,

PATERNOSTER-ROW.

1841.

THE

ENCYCLOPÆDIA OF PLANTS.

PART I.

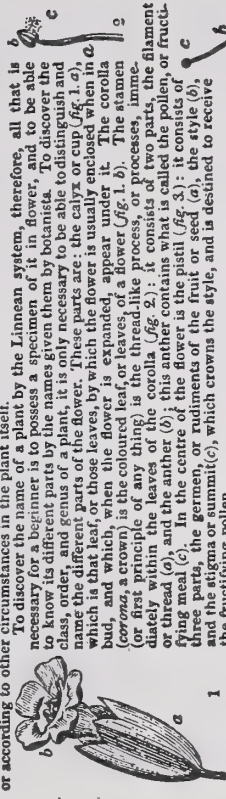
LINNEAN ARRANGEMENT.

THE main object of the artificial system of botanical arrangement is to facilitate the discovery of the names of plants, for this purpose, common to the great number of plants in general, is fixed on, and, according to the Linnean system, which this organ found, individual species are referred to their places in the system, and by their initial letters, are referred to their places in an alphabetical dictionary.

In the progress of artificial systems different organs have been fixed on by different botanists; but those which have been most extensively employed are the corollas by Tournefort, and the stamens and pistils, by Linnaeus. The system of Tournefort has been a good deal employed in France, and may be considered as the artificial system of that country; that of Linnaeus has been employed in most other countries, and is justly esteemed by far the most perfect artificial system which has hitherto been produced. It is, therefore, adopted in this work.

The application of the Linnean system in practice, Sir J. E. Smith observes, is, above all other systems, easy and intelligible. Even in pursuing the study of the natural affinities of plants, this system affords "that it would be as idle to lay aside the continual use of the Linnean system, as it would be for philologists and logicians to alight from the convenience, and indeed necessity, of the Linnean system, and to substitute the Chinese character in stead of the Roman." "The student of the Linnean artificial system," he elsewhere observes, "will perceive that it is to be understood merely as a dictionary, to make out any plant that fall in his way." (*Gram. of Bot.*) "If we examine," says Decandolle, "the artificial systems which have been hitherto devised, we shall find the most celebrated of them, that which was proposed by Linnaeus, to possess a decided superiority over all others, not only because it is consistently derived from one simple principle, but also because the author of it, by means of a new nomenclature, has given to his terms the greatest distinctness of meaning." (*Elements of the Philos. of Plants, by Decandolle and Sprengel.*) Whether or not subsequent advances in science may enable botanists to dispense with the Linnean system altogether, it is not for us to affirm; but in the meantime nothing can be more certain than that the Linnean system is the best leading arrangement for such a work as the present, in the existing state of botanical knowledge in Britain.

According to the Linnean system all plants are furnished with flowers, either conspicuous or inconspicuous. The plants with conspicuous flowers are arranged according to the number and position of their stamens and pistils; those with inconspicuous flowers are arranged according to the situation of the flowers on the plant, or according to other circumstances.



To discover the name of a plant by the Linnean system, therefore, all that is necessary for a beginner is to possess a specimen of it in flower, and to be able to know its different parts by the names given them by botanists. To discover the class, order, and genus of a plant, it is only necessary to be able to distinguish and name the different parts of the flower. These parts are: the calyx or cup (*fig. 1. a*), which is that leaf, or those leaves, by which the flower is usually enclosed when in bud, and which, when the flower is expanded, appear under it. The corolla (*corolla*, and crown) is the coloured leaf, or leaves, of a flower (*fig. 1. b*). The stamens (or first principle of any thing) is the thread-like process, or processes, immediately within the leaves of the corolla (*fig. 2*): it consists of two parts, the filament or thread (*a*), and the anther (*b*); this anther contains what is called the pollen, or fructifying meal (*c*). In the centre of the flower is the pistil (*fig. 3*): it is composed of three parts, the germen, or rudiment of the fruit (*a*), the style (*b*), and the stigma or fructifying organ (*c*), which crowns the style, and is destined to receive the fructifying pollen.

The pistil and stamens are the essential parts of a flower. The corolla or the calyx may be wanting, and yet the flower will be termed perfect, because the absence of those parts is no obstacle to reproduction. Even the style and the filament may be absent without preventing the formation or ripening of the fruit; and there are many flowers which have the anther sitting close to the corolla, &c., without a filament, and the stigma to the germen without a style; but the anther, the germen, and the stigma are essential.

The seed is contained in the pericarp, or seed-vessel, which is the germen when grown to maturity. The name of seed-vessel varies according to its form, substance, &c.; but the word pericarp (*peri*, about, *karyon*, a fruit) is applicable to all its varieties. The receptacle is the base or medium which connects the other parts of the fructification. (*Magazine of Natural History*, vol. I. p. 233.) The degree of knowledge conveyed by the following Table, and the preceding observations, will enable a beginner to discover the class, order, and genus of any plant which he may find in flower.

* The best work in the English language for acquiring a knowledge of the Linnean system of botany is *Smith's Introduction to Botany*; there are also various other works nearly as good, and detailed and familiar *Introductions* to both the *Linnean* and *Jussieu* systems will be found in the first and second volumes of *The Magazine of Natural History*.

2194. *Adiantum*. Sori inserted into the indusium, linear, contiguous, or roundish. Indusium marginal, opening inwards, either nearly continuous, or squamiform, or reniform.
2195. *Crataegites*. Sori dot-like, separate, marginal in the recess of the indusium. Indusium either reflexed across the base of the frond, or squamiform, and arising from the margin, or nearly continuous, opening inwards.
2196. *Davallia*. Sori roundish, nearly terminal and marginal, distinct. Indusium superficial, attached inwards, and opening outwards.
2197. *Dicksonia*. Sori dot-like, marginal, solitary in the recesses of the frond. Indusium membranous, nearly globose, marginal, adnate, opening unequally with lacerated orifices, and spreading back in all directions.
2198. *Elaeagnus*. Sori oblong-linear, nearly terminal and marginal, transverse. Indusium coriaceous, reniform, 2-valved, opening outwards: upper valve marginal, patera-shaped; lower nearly flat.
2199. *Aspidium*. Sori roundish, scattered. Indusium solitary, orbicular, peltate, or reniform.
2200. *Woodia*. Sori dot-like, scattered. Indusium membranous, placed under the sori, somewhat patera-shaped and ciliated.
2201. *Cyathea*. Sori globose, scattered, inserted upon an elevated receptacle, which arises from a division of the stem. Indusium spherical, opening in the middle, and finally becoming patera-shaped.
2202. *Trichomanes*. Sori marginal, inserted upon a long setaceous receptacle. Indusium erect, campanulate.
2203. *Hymenophyllum*. Sori marginal, inserted upon a claviform receptacle. Indusium erect, 2-valved.

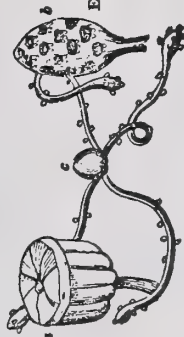
TABLE II. OSMUNDACEÆ.

- Theca without a ring, netted, pellucid, with radiating striae upon their top, bursting lengthwise on one side.*
2204. *Todea*. Sori oblong, seated upon forked veins of an unchanged frond. Theca globose, stalked, netted, opening from their base as high as a pellucid dorsal projection. Indusium none.
2205. *Osmunda*. Sori nearly globose, alternately arising from the margin of a frond, which becomes changed into a panicle. Theca globose, stalked, netted, opening from their base as high as a pellucid dorsal projection. Indusium none.
2206. *Lygodium*. Theca oblong-ovate, striated at the end in a radiate manner, seated in two rows upon 1-sided marginal spikelets, fixed by their backs and opening lengthwise in front. Indusium funnel-shaped, covering up each capsule.
2207. *Arenaria*. Theca ovate, striated at the top in a radiated manner, disposed in compound unilateral spikes, attached by the base, and opening lengthwise. Indusium none.

TABLE III. OPHIOGLOSSÆ.

- Theca 1-celled, adnate at base, reniform, coriaceous, opaque, without a ring, not vascular, sometimes fastened together, half-bivalved.*
2208. *Bolbitis*. Theca naked, globose, distinct, attached to the rachis of a compound spike, half 2-valved, opening nearly at one side.
2209. *Ophioglossum*. Theca naked, connate in a distichous jointed spike, half 2-valved, opening at the side.
2210. *Moravia*. Sori oval, somewhat marginal. Theca united in a double row, opening inwards by a cleft. Indusium arched, opening lengthwise above, 2-valved, inclosing on each side a row of theca.

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EQUISETACEÆ.

Order 2.

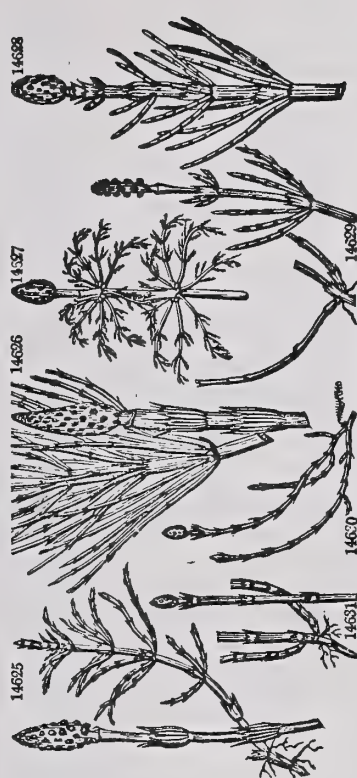
Reproductive organs uniform, in terminal spikes, composed of peltate, several-sided scales, producing on their under surface 4-1 elongated involucres containing the seeds. Branches whorled, rigid.

This order contains one genus only, which is among the most puzzling of all the anomalous formations which are so frequently met with among the lower orders of vegetation. Both the stems and branches are regularly articulated, and arise from a tubular sheath. There are no leaves, and the reproductive organs are arranged in a terminal spike (b), on all sides of which are inserted many peltate scales (a) with several sides or angles. Several wedge-shaped hollow bodies project from the surface of these scales, and bursting inwardly, discharge their contents, granules, and are not yet well understood. They consist of a number of green rounded bodies, surrounded by minute granules, and furnished at the base with four elastic filaments (c), thickened at their apex. By some observers the granules have been considered pollen, the filaments stamens, and the green bodies ovaries; by others the granules have been called naked seeds; by Kaulfuss the wedge-shaped hollow bodies are considered capsules, and the green bodies, seeds. It is probable that none of these theories are true.

2209. *Equisetum*. Character the same as of the order.

2211. *Equisetum*. Literally, horse-hair, from *equis*, a horse, and *seta*, hair; so called, in allusion to the fine branches of all the species. The first five species are noxious weeds on deep loamy soil, especially such as has been gained from rivers or lakes. *E. fluviatile* rises three or four feet high, the thickness of a finger, with numerous branchlets or leaves proceeding from the whorls; according to Haller, this species was eaten by the common people among the Romans. Linnæus affirms, that rein-deer, who refuse hay, will, however, eat this;

that it is cut as fodder for kine, but that it is not so acceptable to horses. *E. hyemale* is the best species for polishing wood and metal, and is imported from Holland for that purpose under the name of Dutch rustica. It is much used by whitesmiths, cabinet-makers, and comb-makers, and formerly it was in demand for scouring pewter and wooden things in the kitchen.



History, Use, Propagation, Culture,

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Order 2.

LYCOPODINEÆ.

Reproductive organs axillary, sometimes apparently spiked. Theca? of two kinds, the one containing minute granules, the other larger bodies. Stems covered with many small leaves.

The reproductive organs of these plants are always axillary, the apparently spiked arrangement which they occasionally present being caused by the partial abortion of the leaves, at the base of which they are seated. The theca (a)? the nature of which is very doubtful, and which have accordingly been called by different writers *capsules*, *conspicua*, and *cocci*, are formed of from one to three valves, and of a similar number of cells, and contain either a mass of minute powdery granules, or some corpuscles of a larger size. The nature and properties of both these are uncertain. Decandolle imagines that one may be the means of fertilizing the other.

2210. *Lycopodium*. Theca reniform, 1-celled, 2-valved, with many sporules. Sporules very minute, ordinary.

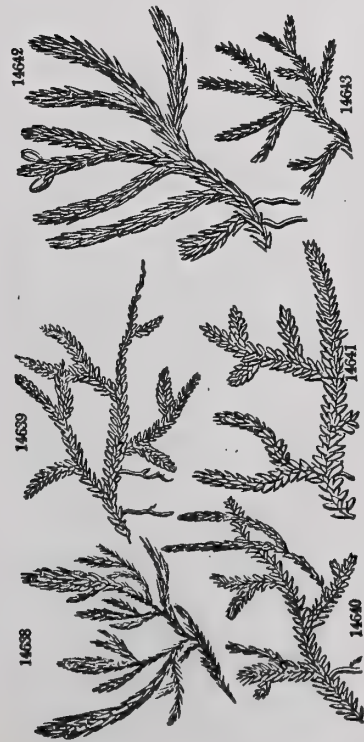
2211. *Psidium*. Theca 3-coccos, 3-celled; cells opening upwards, half 2-valved.

2212. LYCOPODIUM. L. CUR-MOSS. & Δ cu Sp 15-114. 14632 clavatum W. common 14633 Britain hea. D p. Eng. bot. 224

2212. *Lycopodium*. From *lyxos*, a wolf, and *pus*, a foot; on account, as Dalechamp assures us, of the resemblance the roots bear to a wolf's foot. Selago is an ancient word applied to some succulent plant, and derived, according to De Theis, from the Celtic *set*, eight, and *jach*, salutary, as being useful for complaints in the eyes. From the same root *set*, was formed *selma*, the name of Fingal's hall, which in modern language would be called *Belle-see*. The species are neat little evergreen moss-like herbaceous plants, some of which are found in all parts of the world. *L. helveticum* is a pretty prostrate plant, with small bright green leaves; for the beauty of which it is often cultivated in hothouses on the edge of the aquarium, or in pots set in pans of water. *L. Phlegmaria* is a fine species found in various parts of the East Indies, but hitherto a stranger to our gardens. It is a parasite upon the trunks of trees, whence it hangs down in tufts from six inches to a

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foot in length. *L. Selago* is used in Skye, and some other places, to fix colours in dying, instead of alum. The Highlanders employ it in infusion as an emetic and cathartic; but it operates violently, and, unless taken in a small dose, brings on giddiness and convulsions. Linnæus says, the Swedes use a decoction of it to destroy lice on swine and other animals. All the species may be cultivated in a light peaty soil, but they require an abundance of moisture.



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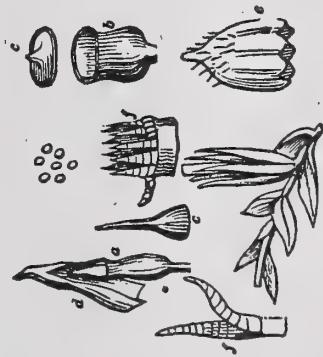
Reproductive organs radical, uniform. Sporules contained in roundish one or many-celled indurated heads.

Plants simple, aquatic.

Very few plants are found in this order. Their vegetation is various; they are at most a few inches high, and are more or less aquatic. In Isoetes the leaves resemble those of a young rush. The organs of reproduction are always near the root, and are variable, and their nature is by no means understood. In Psiluria (a) it consists of a roundish head, divided internally into 1-4 cells, each cell containing small bodies of two kinds. In Isoetes (b) the fructification is even less known and understood.

2214. *Isoetes*. Head membranous, not opening, immersed in the base of the frond, 1-celled. Sporules angular, inserted upon many filiform receptacles.

2215. *Psiluria*. Heads imbricated, solitary, nearly sessile, globose, coriaceous, 4-celled. Cells containing two kinds of bodies.



Order 5.

Reproductive organs of 2 kinds. Theca many-seeded, solitary, furnished with an operculum and columella. Plants leafy.

Mosses are distinguished from all other similar plants, by the peculiar nature of the reproductive organs, which are of two kinds. The principal and the most obvious is a theca (a, b), which is furnished with an operculum or lid (c), by means of which the sporules are retained in the theca, and a columella, or central axis, to which the leaves are attached. The other consist of minute spherical pedicelled organs, concealed in the axis of some of the leaves, and called anthers by Hedwig. The theca is either entire, or split into four valves, is elongated, and when in a very young state it is enclosed in an indusium, which is torn asunder at the apex, is elongated, and being carried up with it, remains upon the summit of the theca in the form of a little extingisher called

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calyptra (d); if the calyptra is slit up one side it is called *dimidiata* (e), if divided at the base into many short clefts, it is termed *mitriform* (f). The orifice of the theca, when the operculum is removed, is either covered by a simple membrane, or by various processes called the *peristome* (g), either annular, or in the form of teeth, and arranged in a single or double row. These processes vary in number, and in the manner of their division; from such differences etc. excellent characters for the genera have been obtained.

The degree of perfection which mosses have received in modern times has brought their arrangement to a degree of perfection unknown in other Cryptogamic orders. This has been effected by the labor of Hooker, Griseb., and Brown in our own country, and of Hedwig, Swartz, Bridel, Schwaeagrchen, Pailot de Beauvoir, Nees von Esenbeck, and Hornschuch abroad. The arrangement of the two last authors is chiefly adopted here from their excellent *Bryologia Germanica*.

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Reproductive organs of two kinds. 1. Theca without an operculum, either naked or sessile, or furnished with a veil through which they are more or less protruded. Sporules naked (e), or mixed with spiral threads (f). 2. Minute roundish or oblong bodies variously situated. Plants frondose of a gelidose structure not submersed.

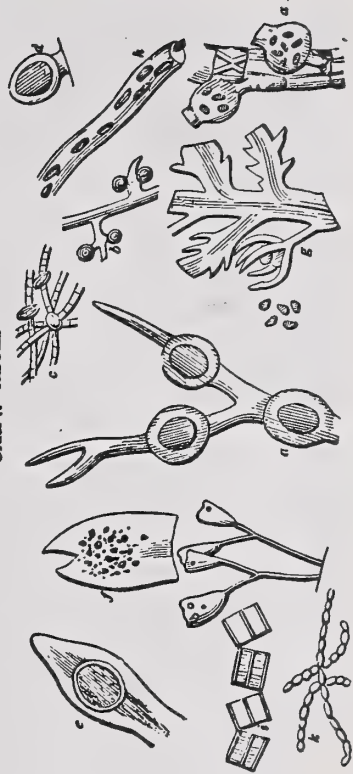
This order is distinguished from Algae, with which it was formerly united, by the nature of the theca (a, b), and of the foliaceous frond (c) which is never submersed, and which bears a greater affinity to that of Nuxia. From

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these Hepaticæ differ in being destitute of an operculum or lid to the theca and, with the exception of *Marchantia* (d) and *Jungfermannia*, of a calyptra. The order is composed of several genera, all very different from each other, and forming an assemblage which is only natural in regard to the degree of vegetation. It does not appear possible to reconcile those of reproduction. The first genus consists of a variously dilated frond lying flat upon the substance on which it grows, generally naked, but in many *Jungfermannias* covered with small leaves, which are often divided, but never really sessile, so that, in fact, they should rather be considered dilations of the frond: the substance is generally loosely cellular, sometimes compact, as in *Marchantia*, in which Hooker asserts that pores of the epidermis exist.

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Order 7. ALGÆ



2309. *Porphyra*. Frond flat, purple, with the membrane of equal texture. Fruit twofold; first, sort of oval sporidia collected in a disorderly manner; second, two parallel lines marked on each side by a globule.

TABLE V. FLORIDEÆ.

Frond coriaceous or rarely membranous, flat or filiform, continuous, purple or pink. Sporidia purple, included in capsules or clustered in sort.

2310. *Polysiphonia*. Frond filiform, fastigiate, coriaceous, compressed or plane, pinnate. Fructification; a cluster of naked warts composed of fibres supporting sporidia.

2311. *Phyllopora*. Root scutate. Fronds compressed or plane, pinnate. Fructification; a cluster of naked granules surrounded by a linear cleft involucre.

2312. *Rhodomenella*. Frond either flat or foliaceous, and somewhat ribbed or filiform. Fruit twofold; first, lomenta filled longitudinally with globules of sporaceous matter; second, capsules with a few pyriform sporidia sessile in the capsule (blackish when dry).

2313. *Chondria*. Frond continuous, gelatinous-cartilaginous. Fructification double; naked granules immersed in the substance of the ramuli and external tubercles.

2314. *Sphaerococcus*. Root scutate. Frond submembranous or cartilaginous. Fructification uniform; tubercles or capsules.

2315. *Haldimannia*. Frond flat or tubular, somewhat membranous. Fruit, dot-like tubercles half immersed in the substance of the frond.

2316. *Reclinorhiza*. Frond filiform, compressed, pectinate, ciliated. Fruit, capsules with pyriform sporidia fastened together in a chain-like manner.

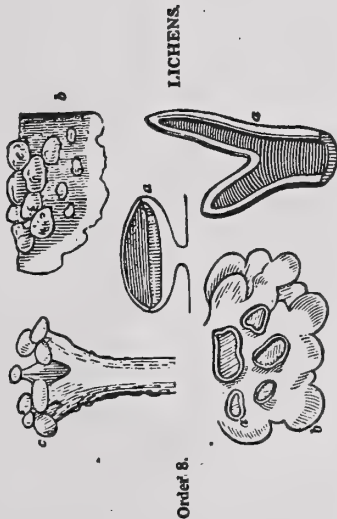
2317. *Delisea*. Root scutate. Frond plane, membranaceous, with or without ribs. Fructification double, tubercles and clusters of naked immersed granules.

TABLE VI. FUCOIDEÆ.

Frond coriaceous, rarely membranous, continuous, olive-green, flat or filiform. Sporidia black, included in capsules, which are either ovate, and surrounded by a hyaline border, and sessile in a peculiar receptacle, or pyriform, and immersed in the frond.

2318. *Lemanea*. Frond filiform, torulose, tubular. Chains of spore adhering to the inner surface of the filament, pencilled moniliform. In fresh water.

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Order 8.

reproductive organs uniform. Sporules deposited in receptacles of various forms, distinct in substance from the thallus or frond, which is either pulverulent, crustaceous, membranous, foliaceous, or branched and shrub-like.

Thus, Algae, and the collateral order Fungi, may be said to exhibit the lowest stage of vegetable development, and to contain the simplest forms of which plants are susceptible. Indeed it seems that each is resolved into the other when in the least stage of composition. Of this order, the lowest tribe, Pseudo-Lichenes, are considered Fungi by some authors, and have been formed into a distinct order by others, under the name of Hypoxyla. Here it seems best to consider them Lichens, like receptacles (a), dispersed over the surface of the

The fructification is usually in the form of shields or cups, and to their nature. Apothecia is the common term used to frond or thallus (b), and bearing various names according to their nature. Apothecia is the common term used to designate the fructification. Podetia are the stalk-like processes of the frond (c), which bear the apothecia on their summit. Sclerites are small hollows or cavities, or the upper surface of the frond. Soredia are little heaps of tree, pulvulent bodies, mostly of a white or yellow color, placed on various parts of the frond (d). Pulvinuli are spongy, ex- crescence-like bodies arising from the frond, and often resembling minute trees. Nucleus prodigiosus, or kernel, is a distinct cartilaginous body coming out entire from the apothecia, and containing sporules. Laminæ prodigiosæ are a distinct cartilaginous body containing the sporules, separating from the apothecia, often very convex and variable in form, and mostly dissolving into a gelatinous mass. The arrangement of Acharius, which is the most celebrated, is here followed.

TABLE I. IDIOTHALAMI.

Apothecia differing in color from the rest of the plant, and formed of a distinct substance.

1. Apothecia simple, entirely formed of a sub-uniform, pulverulent, or cartilaginous substance. HONORATI.

Reproductive organs of two kinds. 1. Thence or tubercles variously situated. 2. Sporules or granules naked or immersed in the frond. Plants always aquatic and submersed.

This order is constituted of the sea-weeds of our ocean, and of the floating scum-like substances of our ditches and rivers. Little is known of the functions which what are called their reproductive organs perform. The nature and structure of the fronds are so various as to render it improbable that they should all be destined for the same purpose.

The bodies which are called sporules are variously situated; now filling distinct theca (a), or even to the interior of the frond (b, c, d), or imbedded in the substance of the frond (e, f); now ap- pearing to be naked and surrounded by an involucre (g); now scattered or arranged in some determinate manner in the interior of the frond (h). The fronds are either cylindrical (a), or plane (i), sometimes little more than a mere membrane, sometimes hard and horny, and extended to the length of many feet. Many are articulated (j, k); their line of separation is then called a joint, and the space between two joints an articulation. Professor Agardh, of Lund, one of the most celebrated of modern cryptogamists, and whose department of Algae is adopted here, in his latest work, called *Systema Algarum*, published at Lund, in 1824, divides the order thus:

"Aquatic plants destitute of cotyledons and of sexual organs; gelatinous, membranous, or coriaceous; filamentous, laminose, or even leafy; in color green, purple, or ochraceous; jointed or continuous; bearing sporidia" ("little transparent bodies containing sporules"), either included in pericarps or scattered over the surface.

The Algae form one of the three forms of the lowest order of vegetation, Lichens and Fungi the two other. Of the former, many are considered by some botanists to be animalcula, and others, to be the young seedling of plants of mosses.

TABLE I. DIATOMEÆ.

Bodies of various forms, flat and crystalline, and separating into fragments.

2319. *Achnanthes*. Frond stalked, vexilliform. Marine.

2320. *Diadema*. Filaments jointed, hyaline, rigid, simple, united in pairs longitudinally, at length separating into articulations cohering by their alternate angles.

2321. *Fragilaria*. Filaments jointed, simple, gelatinous, compressed, fragile, separating at the joints.

2322. *Melobesia*. Filaments jointed, contracted at the joints, very fragile, and easily separating.

2323. *Desmidiium*. Filaments transversely and densely striated, mucous, flexible, green, half separated into articulations, and in that state pinusoid.

2324. *Schnazmania*. Filaments bead-like, composed of narrower cohering filaments inclosing elliptical granules, into which they are finally dissolved. Marine.

TABLE II. NOSTOCHINÆ.

Individuals numerous, globular or filiform, suspended in a gelatine of a definite form.

2325. *Palmella*. Minute or small, somewhat diaphanous gelatinous plants, filled with solitary granules unimixed with filaments.

2326. *Echiniscus*. A roundish gelatine crammed with elliptical radiant corpuscles. Marshy.

2327. *Synedra*. A spongy fleshy lobed frond filled with granules. Marine.

2328. *Nitzschia*. Plants roundish or shapless, gelatinous. Substance composed of curved moniliform simple filaments, lying irregularly in a gelatinous nidus.

2329. *Corythophora*. A gelatinous roundish puckered frond filled with jointed filaments, bearing here and there clavate processes.

2330. *Rimularia*. A gelatinous subglobose frond filled with filaments, radiating from a common centre, con- tinuous, placed on a globe, and marked with annulations inside.

2331. *Chaetophora*. Plant elongated or globose gelatinous. Substance composed of branched articulated filaments.

2332. *Scythymenia*. A coriaceous tough stratum, formed of fibres and granules mingled together.

TABLE III. CONFEROIDEÆ.

Filaments jointed either externally or internally, separate, and not combined in any definite form.

2373. *Hydrodictyon*. Filaments like cobwebs, scattered externally with sporidia. Slightly inundated.

2374. *Nitzschia*. Filaments membranous, solid, opaque, crumbling into powder, torulose. On rocks or bark.

2375. *Chroocarpa*. Filaments rigid, little colored, crumbling into powder, torulose. On rocks or bark.

2376. *Tricocarpa*. Filaments rigid, little colored, bearing capsules, which generally proceed from the last articulation, which is not gelatinous, or funiculate.

2377. *Scytosira*. Filaments not gelatinous, coriaceous. Filaments short, forming dark dense tufts, beaded internally, or filled with annular transverse bodies. On rocks or inundated, rarely marine.

2378. *Sagittaria*. Filaments continuous, coriaceous, naked, marked inside with dots disposed in rings. On rocks.

2379. *Protosira*. Filaments somewhat jointed, rooting very minute.

2380. *Hygrocarpa*. Filaments hyaline, arachnoid, absolutely articulated, floating in a shapeless gelatine or in a colored membrane.

2381. *Leptomitia*. Filaments hyaline or slightly colored, arachnoid, absolutely articulated, separate, erect, not enlarged.

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TABLE IV. ULVACEÆ.

Frond membranous, continuous, tubular or flattened, never ribbed, herbaceous, or very rarely purple. Frond a heap of sporules, either naked, or forming scattered granules covered by conicalia.

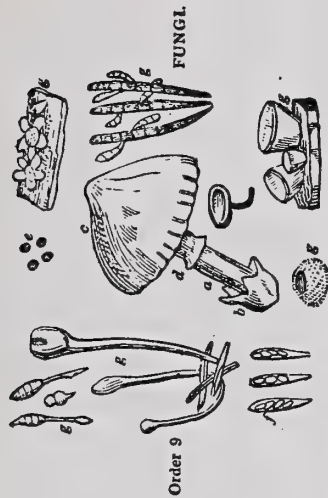
2394. *Fragilaria*. Filaments dichotomous or irregularly branched, somewhat rigid. Fructification; a granu- lated mass within the frond, and external dense granules.

2395. *Chroocarpa*. Frond spongy, of minute diameter, formed of filaments densely packed, which are tubular and continuous, and granular green powder. Conicalia clustered at the surface of the frond.

2396. *Hydrodictyon*. Root minute, scutate. Filaments tubular, continuous, aggregated, branched, pinnate, or imbricated bywards with branchlets. Fructification a dark internal granular mass.

2397. *Scleria*. Frond tubular, membranous, with a striated areolated surface. Sporidia very minute and compact.

2398. *Ulex*. Root scutate. Frond plane, ribless, flabelliform or wedge-shaped, or linear and dichotomous. Fructification naked immersed; granules distributed in fours throughout the frond.



Reproductive organs uniform. Sporules (c) arranged in tubular cells (f) placed in some parts of the external surface. Substance various (g), mostly thick and fleshy, sometimes vesicular. From none

In speaking of the eighth order, Lichens, it has been observed, that they, Algae and Fungi, might be considered collateral. But perhaps Fungi should be estimated as still lower in the scale. Mr. Fries, the Lichens. From some passages in the writings of a celebrated Swedish author upon Fungi, Mr. Fries has made of arrangement is almost entirely altered here, it would seem as if he considered the three orders to consist of the same beings altered by the material on which they grow, and organized according to the different elements upon which they depend for support. Algae, he observes, which are much extended in their native element, water, when exposed to the air, contract and become Lichens. Thus Nostoc muscorum becomes Collema limosum, &c.; and Sir James Smith has even decided, that Lichina pygmaea when growing under water is an Alga, and when above water a Lichen. But the differences between Fungi and Algae, or Lichens, are greater, and arise out of their essence; that of Fungi being always reproductive, of Algae primitive. In Algae, the thallus is the most essential part, and the reproductive organs of secondary importance; in Fungi, the whole plant is generally a mass of reproductive matter, and the thallus always accidental. Fungi always grow upon dead vegetable matter; Lichens always upon living vegetation. The bark which, when living, bears Lichens, produces Fungi as soon as it begins to decay; and even on the same half-dead branch, the living side will be found occupied by Lichens, and the dead by Fungi. The lowest Fungi are considered by Fries, to bear the same relation to Lichens, as the lowest Lichens to Algae; for which reason, he is of opinion, that all infusorial plants are Fungi, and not Algae. But this may be doubted. The number of Fungi, and the number of Lichens, still remain to be detected, especially in extra-European countries. In Sweden, in the small island of Agne furlong, where the number of Phanogamous plants was 420, and of Lichens and Algae 480, Fries discovered more than 2000 species of Fungi.

The most celebrated writers on Fungi are Micheli, Schaeffer, Bulliard, Bolton, Sowerby, and Greville, for figures; and Persoon, Link, Nees von Esenbeck, Fries, and Greville, as systematists. Link defines the essence of a Fungus to be sporules disposed in a series, in elongated tubular cells; the cells situated in some part of the external surface. The part in which the reproductive organs are placed is called the *hymenium* (a), the hollow base from which the stem or *stipes* (a) arises is named the *volva* (b) or *wrapper*; the upper part is the cap or *pileus* (c), which is provided on the inferior surface with thin radiating expansions, which are termed gills or *lamellae*, among which the sporules are situated. Many Agarics have a delicate fringe connecting the margin of the pileus at a certain age with the stem; this is called the veil (d), and is either general (*universalis*), when adnate with the surface of the pileus, but becoming obsolete with age; or it is partial when it extends only from the margin of the pileus to the stipes. The *annulus* (d) is a kind of veil, which is sometimes adnate to the stem, at others free, the capsule of being moved upwards and downwards. The Peridium, Perithecium, or Perisporium, are different names for the envelope immediately encircling the sporules.

TRIBE I. HYMENOMYCETES

Hymenium naked

Class I. HYMENINI u. AGARICINE.

Hymenium distinct. Receptacle long or expanded, superior.

Division I. Pileati.

Receptacle dilated, occasionally branched, having a tendency to an orbicular form. Hymenium together.

Acti fixed.

2385. *Agaricus*. Hymenium in lamella. Lamellae simple, parallel.

* Stem central, with a veil. Gills unchangeable. Sporidia white.

1. *Amantia*. Veil double, universal separate, partial annular somewhat persistent.

2. *Lepiota*. Veil simple, universal, concrete, annular, somewhat persistent.

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TRIBE II. GASTEROMYCETES.

Fungus entirely closed, and bearing sporidia in the centre; and so forming an uterus.

Class I. ANGIOGASTERES

2330. *Sclerotium*. Plant crustaceous, spreading, plane, adnate, uniform. Apothecia composed of minute bodies collected into a compact, homogeneous, subglobular mass, and shagreened colored mass.

2331. *Sclerotia*. Plant foliaceous, coriaceous, lobed, separate beneath, and containing a solid, cellular, bladder parenchyma.

* Apothecia with a raised border.

2332. *Leclera*. Plant various, crustaceous, spreading, adnate, and uniform or foliaceous. Apothecia scutelliform, sessile, surrounded by a cartilaginous membrane; the disk of the thallus is the raised border.

2333. *Calceum*. Plant crustaceous, plane, spreading, adnate, uniform. Apothecia cup-shaped, sessile, or stipitate, cartilaginous, containing a compact pulverulent mass, plane or convex, and forming a naked disk.

2334. *Gyrophora*. Plant foliaceous, coriaceous, or cartilaginous, peltate, mostly monophyllous, free beneath. Apothecia subcylindrical, sessile, or adnate, covered with a black cartilaginous membrane; the disk warty or plated in circles, and bordered.

1 2. *Apothecia subsimple, included, formed of a single covering, containing a capsular body or nucleus.*

HETEROCENI

2335. *Endocarpion*. Plant crustaceous, adnate, of some determinate figure, or foliaceous and peltate. Apothecia globose, concealed in the substance of the plant, surrounded by a thin membrane, furnished with a slightly prominent orifice, and containing a nucleus.

TRIBE II. CENOTHALAMI.

Apothecia partly formed from the substance of the plant.

1. *Apothecia included in wart-like processes, formed from the substance of the plant. PYTHIOMIDI.*

2336. *Thielotoma*. Plant crustaceous, cartilaginous, plane, spreading, adnate, uniform, with wart-like receptacles, furnished with a wide pore, and bordered. Apothecia included, and containing a nucleus within a double covering.

2337. *Pyrenicia*. Plant crustaceous, plano-expanded, adnate, uniform. Recept. wart-like, formed of the thallus, enclosing or surrounding at the base a solitary thallium, with a simple, thick, papillose perithecium, containing a globose nucleus.

2338. *Uredoloma*. Plant crustaceous, plane, spreading, adnate, uniform. Apothecia wart-like, forme from the crust (resembling soredia), submarginate, white, including a naked nucleus.

1 2. *Apothecia scutelliform, subsessile, the disk of a peculiar color different from the border, which is formed from the crust. DISCOMI.*

2339. *Uredoloma*. Plant crustaceous, spreading, adnate, uniform. Apothecia shield-like, the disk concave, colored, immersed in the crust; border formed from the crust, and the same color.

2340. *Uredoloma*. Plant crustaceous, spreading, adnate, uniform. Apothecia shield-like, thick, adnate, and sessile, the disk plane-convex, colored; border thickish, formed from the crust, and the same color.

2341. *Parmentia*. Plant foliaceous, between coriaceous and membranaceous, spreading, appressed, orbicular, lobed, and scitellate, variously divided, fibrous beneath. Apothecia shield-like, attached by a central point; the disk concave, colored, with a border formed from the crust.

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TRIBE III. HOMOTHALAMI.

Apothecia entirely formed of the substance of the frond, and of a similar color.

2354. *Alectorina*. Plant cartilaginous, subfoliiform, fibrous, and somewhat fistulose within, branched, prostrate, or pendulous. Apothecia shield-like, thick, sessile, bordered, wholly formed from the frond.

2355. *Ramalina*. Plant cartilaginous, fibrous, and nearly solid within, branched, somewhat shrubby, mostly sorediferous. Apothecia shield-like, thick, subpedicellate and subpeltate, plane, bordered, wholly formed from the substance of the frond.

2356. *Cornicularia*. Plant cartilaginous, fibrous, and nearly solid within, branched, shrubby. Apothecia orbicular, terminal, obliquely peltate, at length convex, somewhat inflated; the border dentate.

2357. *Ulexia*. Plant much branched, fibrous, mostly pendulous, furnished within with a bundle of elastic fibres. Apothecia orbicular, terminal, peltate, often ciliate at the border.

2358. *Collemia*. Plant subglabrous, homogenous, cartilaginous, foliaceous, or somewhat branched, membranaceous, cartilaginous, and cartilaginous, subfoliiform, bordered, formed from the substance of the frond; the disk sometimes differing in color when dried.

TRIBE IV. ATHALAMI.

Lichens destitute of apothecia, and whose fructification is unknown.

2359. *Leparia*. Whole plant crustaceo-pulverulent, spreading, adnate, uniform. Apothecia unknown.

TRIBE V. PSEUDO-LICHENES

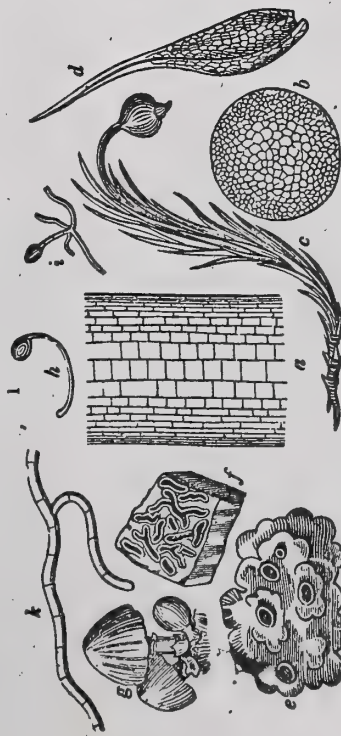
Apothecia black, coriaceous, imbedded in a receptacle. Sporules in slender tubular cells, lying in a pulp, and spontaneously emitted.

2360. *Opographa*. Plant crustaceous, flat, expanded, adnate, uniform. Receptacle oblong and elongated, sessile, covered with a cartilaginous dark membrane, enclosing a solid parenchyma. Disk linear, edged on each side.

2361. *Ferrucaria*. Plant crustaceous, plane, expanded, adnate, uniform. Recept. hemispherical, roundish at the base, grooved into the thallus, with a double perithecium; exterior somewhat cartilaginous and thick, having also a little purple or perforation; inner very fine, and membranous. Kernel cellular.

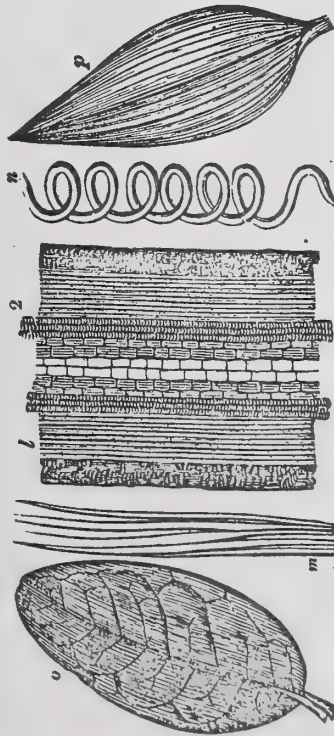
2362. *Porina*. Plant crustaceous, cartilaginous, plano-expanded, adnate, uniform. Recept. wart-like, formed out of the thallus, and not margined. Thallium imbedded in the substance of the wart, with a simple very thin perithecium, and a colored orifice thicker at the surface of the wart. Kernel roundish, cellular.

Plants considered with reference to their general structure, are separated into two grand divisions called **CELLULARES** and **VASCULARES**.
The Cellulares answer to the Linnean Cryptogamia, and are also called Acotyledonous; the Vasculares answer to the rest of the Linnean system, which is sometimes called Phanerogamia and Cortyledonous.



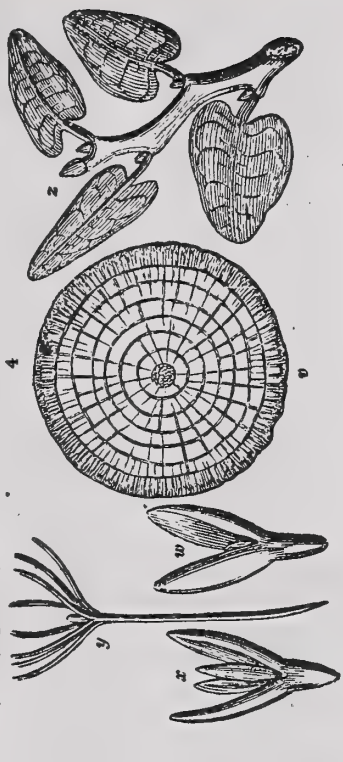
f. Crustaceous thallus of a lichen, with rhizoids.
g. Fungi of the highest dignity.
h, i. Fungi of the lowest rank.
k. Conserve magnified.

CeLLULAR, CYTOLoGICAL, or ACOTYLEDONOUS plants are all, therefore, different terms denoting the same combination of vegetables. The first term is here adopted in preference to the others as expressing the most obvious character upon which the division depends, namely, the cellular, not vascular, structure of the plants composing it. Cellular plants are formed entirely of cellular tissue (*fig. 1.*), without woody fibre or spiral vessels; or in more familiar terms by having no veins in their leaves if foliaceous, and not forming wood; they also are destitute of perfect flowers. The lower tribes, such as Fungi and Algae, are destitute of leaves, and in some points approach the animal kingdom so nearly as to be scarcely distinguishable. In the highest tribe, *Fernæ*, apparent veins are formed in the leaves; but as they are imperfectly supplied with spiral vessels, they cannot be considered more than analogous to the veins of other painted ferns; however, hold the intermediate station between cellular and cellular-vascular plants. In the whole of Acotyledones, it is unnecessary to examine the seed for the purpose of determining whether it has one cotyledon, several cotyledons, or none, the structure of the perfect plant giving the most obvious and satisfactory evidence.



o, Leaf of a dicotyledonous plant.
p, Leaf of a monocotyledonous plant.

Endogenes, or *Monocotyledonous* plants, are the first remove from Cellulars, and hold an intermediate rank between them and *Exogenes* or *Dicotyledonous* plants, in which vegetation occupies its highest form of development. They were formerly characterised by having a single cotyledon, but this circumstance is not only not absolute but difficult of determination, except in those cases where there is no doubt as to the nature of them and Dicotyledones it is that in Monocotyledones there is only one Cotyledon (*fig. 3. p.*) ; or if two, that they are alternate with each other (*fig. 4.*). The physiological structure of the two classes is, however, that by sometimes several, as in Pinus (*fig. 9.*). The physiological structure of the two classes is, however, that by which they are familiarly distinguished, their first principle, the seed from which they originate. In *Endogenes*, or *Monocotyledones*, the great feature of distinction between wood and bark (*fig. 8. q.*) in *Exogenes*, or *Dicotyledones*, the wood and bark being separated by a distinctly annual layer of cellular tissue, is here dissipated (*fig. 4. v.*). In Monocotyledones the wood and cellular tissue are mixed together, without any distinct annual layers of the former being evident; in Dicotyledones the wood and cellular tissue have each their particular limits assigned them, a distinct layer of the former being annually deposited. In Monocotyledones there are no radiations from the medulla to the bark; in Dicotyledones the radiations are distinctly marked. In Monocotyledones the leaves are always jointed with the stem from the base of the leaf, while in Dicotyledones the leaves are always joined with the stem from which they fall off, leaving a scar behind. In Monocotyledones the veins of the leaf pass in parallel lines from the base to the apex, whereas in Dicotyledones they diverge from the midrib towards the margin at various angles; in the former they are unbranched, the principal veins being connected by nearly simple secondary veins; in the latter they are much branched, traversing in many directions, and giving the surface of the leaf a netted appearance.



v. Transverse section of a dicotyledonous stem.
w. An embryo with two cotyledons.
x. An embryo with four cotyledons.
y. An embryo with many cotyledons.
z. Stem axis, leaves of a dicotyledonous plant.

2). Such are the very obvious distinctions of the two great classes of Phanerogamous, or flowering, plants; and so far, at least, any necessity for dissecting a seed in order to ascertain its structure, and thus to ascertain the nature of the most easy determination, and about which there can be in one case in five hundred the slightest cause of doubt or difficulty. It is almost impossible to take even a morsel of a plant in the hand without instantly being in possession of the knowledge of the structure of its seed, with respect to the axile placentation.

It only remains to explain briefly upon what principles the names of the orders, suborders, &c. are formed. It is usual, in the school of Jussieu, to give to a natural order a name derived from that of the genus which is understood to be the type of the order; as Ranunculaceæ from Ranunculus, Rosaceæ from Rosa, and so on. But several deviations from this principle had been admitted by Jussieu, in favor of certain groups of plants, long known by other popular names, derived from certain peculiarities; such as Labiatæ, because the corollas are labiate; Compositæ, because their flowers are some others. It would, perhaps, have been better to have accounted of the resinous juice in which they abound, and what some others. It is not now late to remedy the evil, if such it be; nor would the advantage of alteration be at this day equivalent to the inconvenience. For the purpose of making it at once apparent, whether, in speaking of a group of plants, the reference is had to an order or a suborder, it has of late years been thought convenient to place the name of the natural order in *acces*, and of the suborder in *æz*. Thus, in speaking of the whole mass of which Ranunculus is the representative, and of the suborder in *æz*, the term *Ranunculæz* is used. But in speaking of a group of which Ranunculus forms a part, the term *Ranunculus* is employed. This manner of speaking is, however, at present, very partial in application, and of little importance, except in a few cases, of which Ranunculaceæ is one of the most striking examples. In these orders, the terms of which, necessarily, of which grammatical construction, end in *æz*, Orbidæ, it is obviously inapplicable, without a total change in a great measure of the order; and orders, measures which cannot be too much deprecated.

part of the nomenclature of natural orders,⁷ a measure which cannot be too much deprecated.

It may, perhaps, be finally expected, that these views should be fully combined with the principles and distinguishing work, from which they are derived, so as to form a complete system of Botany, in accordance with the classification of the Natural System of Botany, may derive the necessary information. Unfortunately, however, such a work has at present no existence. M. Descandolle's *Théorie Élémentaire de la Botanique* explains the principles upon which the orders of plants are constituted; and M. de Jussieu's *Genera Plantarum* contains their characters, as determined in 1789: but the latter is now too obsolete to be very useful to the tyro. In our own language, the only work that can be consulted upon the subject with advantage, is the *Flores Scoticae* of Professor Hooker, the only work that the characters of the natural orders of Scottish plants are completely explained by Mr. Lindley. We understand a work upon the subject is in preparation, the author of which will give us his great desideratum. It will be published, I am persuaded, before long. It may be expected to appear in the next year, 1853, previously to which, however, the division Botany, in the forthcoming *Encyclopædia of Natural History* will have been published, in which much information may be expected upon this important subject.

II. CELLULARES.

The characteristics of this division have already been explained in the preliminary observations upon the natural orders; and the remarks which were required for each natural order of Cellulares have already been given in Cryptogamia in the body of the work. It has, therefore, been thought advisable to adopt from Professor Agardh such observations as he has made upon the orders, as a sort of contrast to those already given.

CLASS I. FOLIACEÆ.

ORDER I. FILICES.

Of these the stem is perennial, often subterranean and creeping, and occasionally becoming arborescent and leafy above the ground. The fronds or leaves are usually pinnatifid, and more or less compound; sometimes simple and entire, with revolute veins. The capsules are minute, one-celled, seldom many-celled, brown, membranous, and surrounded by a thick articulated elastic ring, irregularly bursting, and either clustered on the lower surface of the frond, or compound in spikes. Their vernation is circinate, and some are propagated by bulbs. The old botanists denied any fruit whatever to Ferns; believing the seeds of these plants to be so rare as to invent any body with invisibility who could collect them. Afterwards, their capsules were believed to be their seeds. Linnaeus, and some others, doubted whether their fructification were seeds or pollen. Finally, the experiments of Enhart and Lindsay proved, beyond all cavil, that they were really seeds. As to the male organs nothing is known; some suppose them to be glands of the frond, others the elastic ring, some the indusium, and others the pores of the epidermis; lastly, Martius has supposed them to be the membrane including the spiral vessel. Ferns are chiefly inhabitants of the torrid zone, becoming rarer as we approach the poles. They delight in a humid soil, and they often grow parasitically upon trees. The medicinal virtues of some are highly astrigent, of others emollient, and of others astringent. The young leaves and roots of some are eaten, and the fronds of others are used as a vegetable. The young leaves and roots of some constitute an article of food; beer is obtained from the roots of others, and, finally, *Aspidium fragrans* has been used as tea.

ORDER II. EQUISETACEÆ.

Marsh plants, with a verticillate arrangement of their branches, and a highly indurated epidermis. Their seeds are remarkable for a hygrometrical movement. The quality of some is said to be hurtful to cattle, which is denied by others. Formerly they were used in medicine as astringents and diuretics. *Equisetum hyemale* has been employed for tea, and as a polishing material for furniture, under the name of Dutch 5211 *Equisetum L.*

ORDER III. LYCOPODINEÆ.

With the habits of mosses they have the seeds of ferns. They are herbaceous prostrate plants, with imbricated simple leaves. *Lycopodium complanatum*, Selago, and *clavatum* as used as dyes; the sporules of *Lycopodium clavatum* are said to be employed for ameliorating wine, and are also used in making fire-works, on account of their inflammable nature. The herb of *Lycopodium clavatum* and Selago is emetic, and produces abortion. *Lycopodium phlegmaria* is reputed an aphrodisiac. 5212 *Lycopodium L.*

ORDER IV. MARSILEACEÆ.

Floating or erect simple-leaved plants of no known use. The Marsileas, which are to some countries what Lemna is to this, are not known in cultivation.

CLASS II. APHYLLÆ.

ORDER V. MUSCI.

Winter plants, reviving in humid air, abundant about the poles, rare at the equator. They cover the mountains of the earth as high as the limits of perpetual snow; growing in patches, they clothe the most barren spots with verdure, preserve trees from heat and cold, prepare the earth for nourishing more perfect plants, and fill up bogs and morasses with vegetable matter. To the economy of nature they are, therefore, more subservient than to the purposes of man. Medicinal astringent properties were formerly ascribed to some few, but they are now neglected or forgotten.

ORDER VI. HEPATICÆ.

Creeping small plants, with their leaves arranged in an imbricated manner. They differ from Lichens in structure, color, and fruit; from Musci, in the dehiscence of their capsule. Their qualities are mild, if any; some of them are fragrant. 5255 *Riccia E. B.* 5257 *Targionia E. B.*
5256 *Anthoceros E. B.* 5258 *Spharocarpus E. B.*

5253 *Juncgmannia L.*
5254 *Marchantia Mica.*

ORDER VII. ALGÆ.

Plants ascending from the simplest form known in vegetation to a very compound state. The lowest are filiform, leafless, with their fructification immersed; the highest are leafy, with the fructification included in an indehiscent wart-like pericarpium. Some copulate like animals, others have a spontaneous motion like

worms. Their color is lively, in the lowest grades green, in the highest red or purple. Some are ephemeral and microscopical, annual or perennial, and others extend to the length of many fathoms. They grow at the bottom of the sea, or in fresh water, the depths of which they clothe with vegetation, as the higher orders of plants cover the earth with forests. They grow on stems in the water only, or on each other. Some exhale oxygen, others are scented like violets. Their taste is mild; their substance gelatinous, membranous, or coriaceous, usually covered externally with mucus. The structure of the lowest is articulated; of the highest fibrous.

ORDER VIII. LICHENS.

Lichens are not only most useful in the Economy of Nature, as preparing the surface of the earth for the reception of larger vegetables, but they are, moreover, of great utility to man. Many, as *Cetraria islandica*, are eatable, having a bitter principle, and giving out a styptic tincture, if immersed in alcohol. Others, steeped in urine or salts, are used for dying; crustaceous species of this kind are *Varicolaria orina*, *Lecanora tartarea*, *Leparia chlorina*, &c.; foliaceous species, *Parmelia saxatilis*, *Sticta pulmonacea*, *Sororia crocea*, *Gyrophora delata* and *pustulata*, &c.; and branched kinds, *Roccella tinctoria*, *Sticta pulmonacea*, *Orchelia*, *Urena plicata*, *Alectoria jubata*, and others. In medicine, *Cetraria islandica* and *mivalis*, *Sticta pulmonacea*, *Alectoria usneoides* are tonic and nutritive; *Parmelia patetica*, *Borreria purpuracea*, *Evernia prunastri*, &c., are astringent and febrifugal; *Peltidea aphthosa*, antihelmintic; *Evernia vulpinia*, poisonous. Some yield a gum, as *Evernia prunastri*; *Sticta pulmonacea* may be employed for bittering beer instead of hops, and *Ramalina*

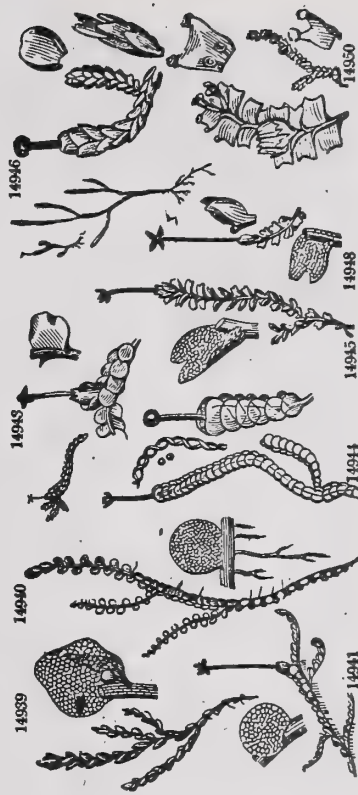
scapulorum instead of soap. The various species give the grey hue to old walls and stones, cover desert heaths, and mottle the bark of ancient trees.

ORDER IX. FUNGI.

We have now reached the lowest station of vegetable existence, in arriving where the vesicles which compose the vegetable fabric are combined in various forms, according to the contingent circumstances under which they are developed. The mould on the cheese, the ergot of corn, the rust of the rose, and the huge *Bolletus*, which, in Java, spreads out its many-handled body from the trunks of ancient trees like a vegetating demon, differ only in the number of the vesicles of which they are composed. Many species are eatable, as *Agaricus campestris*; others are deadly, as *Bolletus scaber*; some are used medicinally, as *Dadalia suaveolens* in coughs; *Agaricus tuba* regimine in diarrhoea; *Agaricus piperatus* in calculous disorders; *Phallus Mokiatus* against cancer; *Polyporus annosus* against the bites of serpents. Some Coprini are used for healing ulcers; *Polyporus officinalis* as a purgative; *Polyporus igniarius* as a styptic; *Polyporus destructor*, and a number of others, constitute dry rot. For the poison of fungi, the foot of garlic, the foot of the mushroom, and the tincture of lacmus, are said to be remedies; arsenic is common spirit of fungi, and is found in all the coldest countries of the world, but as we approach the equator they are extremely rare, the place where they most flourish is Sweden, and the adjacent regions.

After the most perfect classification which the present state of botanical knowledge renders practicable, there still remain a few genera which are incapable of having their true station assigned to them, either on account of their structure being incompletely known, or of their being not having yet been discovered. As far as this work is concerned they are the following, all of which are Dicotyledones.

- 1861 *Neptenthes W.*
1863 *Latrophyllum W.*
1866 *Ceraophyllum W.*
1462 *Antonia W.*
3068 *Antidema W.*
3088 *Eucia W.*
1866 *Acuba W.*
405 *Brexia Nor.*
442 *Vallisia Fl. per.*



COLLECTIONS

OF THE

MASSACHUSETTS

HISTORICAL SOCIETY.

VOL. I.
OF THE FOURTH SERIES.

BOSTON:
PUBLISHED BY THE SOCIETY.

1852.



[90]

NOTICES. — COMMUNICATED BY REV. DR. LOWELL.

I. In the ninth volume of the Historical Collections, first series, p. 234, there is a communication from Cotton Tufis, Esq., stating that, being in Gloucester, Sept. 8th, 1790, he "was informed that the kind of vessels called Schooner derived their name from Mr Andrew Robinson of that place.

I find in a journal of Dr. Moses Prince, a brother of the annalist, which has lately been put into my hands, a corroboration of the above statement, that Mr. Robinson was the inventor of the vessel denominated Schooner. Under the date of Gloucester, Sept. 25th, 1721, Mr. P. says: "Went to see Capt. Robinson's lady, &c. This gentleman was the first contriver of schooners, and built the first of the sort about eight years since, and the use that is now made of them being so much known, has convinced the world of their convenience beyond other vessels, and shows how mankind is obliged to this gentleman for this knowledge."

II. In the fourth volume of the Collections, first series, p. 203, in a communication from Dr Belknap, is the following statement: "The present constitution of Massachusetts was established in 1780. The first article in the Bill of Rights asserts that all men are born free and equal. This was inserted not merely as a moral or political truth, but with a particular view to establish the liberation of the negroes on a general principle, and so it was understood by the people at large," &c. I feel an honest pride in saying, as I have authority to say, that this clause was introduced by my father, the late Judge Lowell, for the purpose above stated, and that, on its adoption by the convention, he offered his services, as a lawyer, gratuitously, to any slave in the Commonwealth who might wish to substantiate his claim to freedom.

DESCRIPTIONS

OF THE

RAPACIOUS BIRDS

OF

GREAT BRITAIN.

BY

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LYCEUM OF NEW YORK, &c.

MACLACHLAN & STEWART, EDINBURGH:

BALDWIN & CRADOCK, LONDON; AND

HODGES & SMITH, DUBLIN.

MDCCCLXXXVI.

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PREFACE.

7

Although I have been anxious to render the work entirely original, I have on many occasions been obliged to have recourse to the observations of others. These,

however, I have always attributed to their authors, not judging it honest to give them as my own in a disguised state, as I observe to be a common practice with men who would scruple to pick their neighbour's pockets, probably because they should run the risk of being sent to study ornithology in Botany Bay. I have not invented any new names, generic or specific, nor cleverly appended a "mihi" to the tail of any species. In some instances, however, I have judged it necessary to alter the English name.

While I acknowledge the obligations which, in common with the world, I owe to persons, such as Montagu, M. Temminck, Mr Selby, and Mr Audubon, who have published descriptions of birds; I am not disposed to forget those generous individuals who have aided me in the prosecution of my inquiries. At the end of the volume you will find a statement of facts relative to this subject.

45 EAGLES AND HAWKS.

Agreeably to these and other circumstances, the genera might be arranged thus :

HALIAETUS.		
AQUILA		PANDION
BUTEO		FALCO
PERNIS		ACCIPITER
MILVUS.		
	CIRCUS.	

This arrangement may, of course, be converted into the circular form. But another, with a central genus, is quite as natural. Thus :

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HALIAETUS			
AQUILA		PANDION	
BUTEO	FALCO	ACCIPITER	
PERNIS		CIRCUS	
	MILVUS		

Or they may be disposed in the following manner, in a double circle :

HALIAETUS				
PANDION				
MILVUS	PERNIS	FALCO	BUTEO	AQUILA
ACCIPITER				
CIRCUS.				

Or in transverse, direct, or diagonal series of three; and here we have the mystical number :

BUTEO	AQUILA	HALIAETUS
PERNIS	FALCO	PANDION
MILVUS	CIRCUS	ACCIPITER.

Many other, equally *natural*, arrangements might be proposed, and each of them, as well as the above, might afford ample scope for exposition. In fact, a good commentary on these four figures would occupy a hundred pages or so. I therefore leave them to the learned.

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The number of vertebræ in six species of this family is as follows :

	Cervical.	Dorsal.	Sacral.	Caudal.
Haliaetus Albicilla	11	9	12	8
Aquila Chrysaetus	12	9	12	8
Buteo vulgaris	12	9	11	8
Falco Tinnunculus	12	9	12	8
Falco Æsalon	12	9	11	9
Circus cyaneus	12	8	12	8

The posterior dorsal vertebræ are sometimes, but rarely, anchylosed. It will be understood that I do not allude to the lumbar and sacral, which with the pelvic bones form a large continuous mass, so that their number can be determined only by counting the foramina.

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FALCO TINNUNCULUS.

While

writing this account, I have before me, along with five others, a fresh male, fourteen inches and a half long, and twenty-eight inches in alar extent; and the greatest length of any female that I have seen did not exceed fifteen inches. In this respect, the kestrel is best contrasted with the peregrine falcon and the sparrow hawk, between the males and the females of which there is an extraordinary difference. The American Sparrow Hawk, *Falco Sparverius*, is very nearly allied to the Kestrel, as is the *Falco tinnunculoides* of the south of Europe. Whatever may be the habits of the latter, those of the former, according to Mr Audubon, are similar to the habits of our species, in so far as regards the hovering, so much talked of as a singular phenomenon. This mode of assuming a fixed station in the air for observation, is, however, observed in the hen-harrier, the sparrow hawk, and the buzzard. Even the osprey, one of the largest of our birds of prey employs it, so that all theories formed on this circumstance, and tending to separate the Kestrel from other falcons, ought to be remitted to their authors for revision.

In the series of British falcons, the Kestrel and the Merlin are the species most nearly allied. The young of the latter bear a considerable resemblance in colour, as well as in form, to the young and the female of the former. In fact Buffon has figured a female kestrel as a merlin, although he talks as if he were very familiar with both species. It has been remarked that this bird is more crepuscular than our other hawks; but I have not observed this to be the case, and indeed an intelli-

KESTREL.

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gent friend of mine is of opinion that the sparrow hawk

flies later than any other species, although I cannot affirm that it does. You may sometimes see a hawk of any species flying late in the evening, but in the dusk I have never seen one actually hunting.

The Kestrel is easily tamed, and, according to Willughby and others, was formerly employed by idle people for seizing small birds and young partridges. It is sometimes named the Kastril, Kestril, or Kistril, the Windhover, the Stannel, Stonegall or Steingall, and Sparrow Hawk. By the Highlanders it is united with the bird that properly bears the latter name, under the common appellation of Clamhan, to which is sometimes added the distinctive epithet ruadh, or red.

Falco Tinnunculus. *Linn. Syst. Nat.* vol. i. p. 127.

Falco Tinnunculus. *Lath. Ind. Ornith.* vol. i. p. 41.

Kestrel. *Mont. Ornith. Dict.*

Faucon Cresserelle. Falco Tinnunculus. *Temm. Man. d'Ornith.* p. 29.

Falco Tinnunculus. Kestrel. *Flem. Brit. Anim.* p. 50.

Kestrel. Falco Tinnunculus. *Selby, Illustr.* vol. i. p. 47.

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FALCO ÆSALON.

I

have never seen a female merlin more than thirteen and a half inches in length, nor a male less than twelve. In this respect also the merlin is allied to the kestrel. Montagu, however, states that the length of a male which he has described was ten inches, and its weight about five ounces; while those of the female were twelve inches and a half, and nine ounces.

According to authors, the Merlin is generally distributed over Europe and the north of Asia. Dr Richardson found it in the British settlements in North America. It is said to be easily tamed, and was formerly employed in the chase, having been flown at larks, quails, and other small birds.

By the country people it is named the Sparrow Hawk, it being by them generally confounded with the bird which properly bears that name. The name Merlin is derived from the French Emerillon.

Falco Lithofalco. *Lath. Ind. Ornith.* vol. i. p. 47. Adult.

Falco Æsalon. *Lath. Ind. Ornith.* vol. i. p. 49. Female and Young.

Stone Falcon. *Mont. Ornith. Dict. Appen.* Adult Male.

Merlin. *Mont. d'Ornith. Dict.* Adult Male and Female.

Faucon Emerillon. Falco Æsalon. *Temm. Man. d'Orn.* p. 27.

Merlin. Falco Æsalon. *Selby, Illustr.* vol. i. p. 51.

Falco Æsalon. Merlin. *Flem. Brit. Anim.* p. 50.

GOSS HAWK.

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REMARKS.—I have compared British and French with American specimens, both in the adult and young states, and am perfectly persuaded that no real difference exists between them. Were we to found specific distinctions upon such trifling discrepancies as are exhibited by the Goss Hawk of America and that of Europe, we might find that our common ptarmigan, our bulfinch, wheatear, and kestrel, are each of two or three species. Cuvier, in my opinion very strangely, refers to

the Falco atricapillus of Wilson, which is the American Goss Hawk, as a species of Hierofalco, that is, as intimately allied to the Jer Falcon. The only name by which this species is known in Britain, is that prefixed to this article, but variously written, Goshawk, Gos-hawk, or Goss Hawk, and apparently a corruption of Goose Hawk.

Falco Palumbarius. *Linn. Syst. Nat.* vol. i. p. 130.

Falco Palumbarius. *Lath. Ind. Ornith.* vol. i. p. 29. The old bird.

Falco gentilis. *Lath. Ind. Ornith.* vol. i. p. 29. Young.

Goshawk. *Montagu, Ornith. Dict.*

L'Autour. Falco Palumbarius. *Temm. Man. d'Ornith.* p. 35.

Gos-hawk. Astur Palumbarius. *Selby, Illustr.* vol. i. p. 29.

Buteo Palumbarius. Goshawk. *Flem. Brit. Anim.* p. 54.

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ACCIPITER NISUS.

SPARROW HAWK.

It is to be observed, however, that all small birds do not fly after hawks. Thus, I have never seen thrushes, blackbirds, wagtails, or wrens, pursuing a kestrel or sparrow hawk; nor do partridges fly after a goss hawk, nor grouse after a peregrine falcon. The feaser (Lestris) is sure to be attacked by terns when he appears among them; but I believe the common gull, the kittiwake, or the black-headed gull, seldom if ever molest him. Eagles are frequently assailed by ravens and skuas, but never by hooded crows, nor indeed by any other bird whatever, excepting the goss hawk, the peregrine, and some other hawks, when they happen to pass near their nests. Again, small birds often attack the cuckoo, which, although he may look like a hawk, is quite innocent; and should they meet with an owl in broad day, they neither scruple nor fear to reproach him. These are facts which most people have observed; but the explanation of them seems not very easy. The prevalent idea is this:—small birds being the natural prey of hawks, the former bear, and with good reason, a grudge against the latter; when a hawk is observed wending his solitary way over the fields, they call to each other, and collecting in a band, assume a certain degree of courage, which, combining with their hatred towards the marauder, impels them to pursue and to harass him. Attack him they dare not, for they are conscious of their inability to injure him; they therefore hover about him, venting their spite in loud execrations; and as some fly over and others under him, some to the right, and others to the left, the hawk is distracted so as to be unable to single out an individual. The small birds know this, and continue

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their impertinent intrusion until tired of the sport. But, before this theory can be admitted, it will be necessary to shew that hawks are occasionally beset by the very species of small birds on which they habitually prey, which has not yet been done. How does a bird, which under ordinary circumstances manifests extreme terror at the sight of another, under other circumstances, muster sufficient courage to pursue it? Is

it certain that a hawk is unable to single out a bird from a flock; or is there reason to think that a troop of swallows, which have no weapons that could inflict the least injury on a hawk, could in the smallest degree affect it with fear? It is observable in our own species, that cowards, the moment the danger is over, assume so much more courage than is natural to them, that in the midst of the excitement they will even make a venture which in ordinary circumstances they would not have courage to do. Well, the small birds that we speak of are all cowards in the presence of hawks at least, and when one of the latter comes unawares among them and carries off one, or passes over without purging them, they soon recover from the fright, and being elated beyond their ordinary state, in a degree corresponding to the previous depression, they muster spirit enough to go on for some time with a mock pursuit; and this seems to me to be the whole mystery solved in the matter of hawks. The cuckoo they probably mistake for a hawk, as did Aristotle and the ancients, and an owl is not less rapacious than a falcon, although by day he cannot see well, and is the less liable to frighten away the little braggarts.

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ACCIPITER NISUS.

this is the Sharp-shinned Hawk of America, *Falco velox* of Wilson and Bonaparte, which is about the same size, and similarly coloured. It has been remarked by two of my friends, that our sparrow hawk often flies late in the evening. When I have seen it on such occasions, however, I have been disposed to consider it, not as searching for food, but as returning homewards, perhaps from a long excursion.

In the British series we must now pass to groups more nearly related to the Buzzards than to the Hawks, properly so called. From *Haliaetus* we have seen a double series proceeding:—on the one hand, Pandion, Falco, and Accipiter, which have now been described; on the other, Aquila and Buteo, which have also been described. After the latter come the genera Pernis, Milvus, Elanus, and, finally, Circus, which latter uniting the two series, or, if you will, completing the circle, leads us to the family of Owls.

The only vernacular English name that I have heard applied to the present species is Sparrow Hawk. Those Highlanders who still retain their original and most ancient language, name it An Speirsheog, although it also obtains from them the name of Clamhan. It is the bird described by my worthy friends, the chosen six, one of whom makes it a Buzzard, under the following names:—

Falco Nisus. Linn. *Syst. Nat.* vol. i. p. 131.

Falco Nisus. Lath. *Ind. Ornith.* vol. i. p. 44.

Sparrow Hawk. Mont. *Ornith. Dict.*

L'Epervier. *Falco Nisus.* Temm. *Man. d'Ornith.* p. 56.

Buteo Nisus. Sparrow Hawk. *Flem. Brit. Anim.* p. 55.

Sparrow Hawk. *Accipiter fringillarius.* Selby, *Illust.* vol. i. p. 32.

VARIATIONS.—Individuals differ considerably in colour, but chiefly in the extent of the yellowish-white of the head and neck. Sometimes the crown of the head and the throat only are of that colour, with indications of the same on the hind neck and shoulders. Independently of the colouring, the old birds may be distinguished from the young, by the greater size of the bill, toes, and claws. M. Temminck states that he has traced the variations of colour on individuals kept for the purpose. I therefore adopt his views on the subject, considering the oldest birds to be those which have most white. My descriptions, however, are all taken from birds, not borrowed.

HABITS.—Not having had opportunities of studying the habits of this bird, I am obliged to have recourse to the observations of others. The authors of recent date, whose accuracy I have found to be highest, are,

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CIRCUS ÆRUGINOSUS.

Montagu, M. Temminck, and Mr Selby. The first of these inform us, that the moor harrier appears to be local, mostly frequenting swampy moors and barren situations, and though rarely met with in the cultivated parts, is the most common species of its family about the sandy flats on the coast of Caermarthenshire, where it preys on young rabbits.

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Having described the different species of the Falconine family, I now proceed to introduce those of the Strigine, or the Nocturnal Birds of Prey. The genus *Circus* exhibits the nearest affinity to the Owls generally; but some of the latter have also a marked relation to the genus *Falco* in particular, and others to the Buzzards, as will be subsequently explained.

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Indeed, I have seen no figures of birds, excepting those of "the Birds of America," and some wood-cuts, including those of the "Gardens and Menagerie of the Zoological Society," that did not indicate an utter incapacity in their authors for seizing the characteristic forms and expression of the originals.

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As an example of the inaccuracy of random assertions, I here quote two sentences from a work on British Birds. "An owl, in its plumage, looks a thick, stout, and even clumsy bird; but strip off the feathers, and it is really nothing. The great owl (*Strix bubo*), the size of which has been compared to that of the eagle, is not one-fourth of the weight." Compare this with the statement at pages 439 and 434. The weight of the most robust eagle I ever handled was 12 lb. 14 oz.; that of the smallest male 7 lb. 12 oz.; that of a female eagle-owl 7 lb. 4 oz.

MAGAZINE

OF

ZOOLOGY AND BOTANY.

CONDUCTED BY

SIR W. JARDINE, BART.—P. J. SELBY, ESQ.

AND

DR JOHNSTON.

'*Rerum naturalium sagax indagator.*'

VOLUME FIRST.

W. H. LIZARS, EDINBURGH;
S. HIGHLEY, 32, FLEET STREET, LONDON; AND
W. CURRY, JUN. & CO., DUBLIN.

MDCCCXXXVII.

American Journal of Sciences and Arts. Conducted by BENJAMIN SILLIMAN, M. D. LL. D. Vol. XXIX. No. 2. January 1836. New-haven. London agent, O. Rich.

I. Zoology.

CHARLES FOX, of Durham, p. 291, Notice of some American Birds. A notice of some birds observed during a tour in North America. The author mentions an instance of the young of *Molothrus pecoris* in the nest of *Fringilla socialis*, where both species were reared and attended to. Wilson and Audubon mention that this had never taken place.

JUDGE SAMUEL WOODRUFF, p. 304, Notices in Natural History. Two notices, one upon a species of Snake supposed to be *Col. sipedon*, Linn. which the author found to be viviparous. The second, on what he terms the "Moulting of Snakes."—It extends from the end of May to the end of September, the largest specimens moulting latest. In casting the skin he observed it done in the following manner by one kept in confinement: "After the animal, by pressing the part against the wires, had succeeded in thrusting back the skin three or four inches upon the neck, he left the wires, and throwing his body into a coil round itself, so as to embrace within it the last fold the inverted skin, with a strong muscular pressure, made at the same time a powerful effort, shot his body forward through the coils, which unfolded one after another, and thus drew off the entire skin."

MISCELLANEOUS INFORMATION.

Sixth Meeting of the British Association for the Advancement of Science.

President,—Professor Henslow.

Vice-Presidents,—Rev. F. W. Hope, Dr J. Richardson, Professor Royle. Secretaries,—John Curtis, Esq.; Professor Don; Dr Riley; S. Rootsey, Esq. Committee,—W. Yarrell, Esq.; Rev. L. Jenyns; T. Mackay, Esq.; C. C. Babbington, Esq.; Professor Nilsson (*of Lund.*); Hon. Ch. Harris; Rev. — Phelps; Richard Taylor, Esq.; T. C. Eytton, Esq.; J. E. Bowman, Esq.; W. C. Hewitson, Esq.; Dr Scouler; Dr Jacob; Rev. — Ellocombe; G. J. Jeffries, Esq.; R. M. Ball, Esq.; Colonel Sykes; J. L. Knapp, Esq.; N. A. Vigors, Esq.; E. Forster, Esq.

The proceedings of this Section were continued during Monday, Tuesday, Wednesday, and Thursday. On Friday the members separated for the purpose of making various excursions, to explore the Natural History of the neighbourhood. Much interesting matter was brought forward and discussed, of which we cannot pretend to give a very minute detail. Dr Richardson's Report on the Zoology of North America was prepared at the request of the Association, and will be printed at full length in their Transactions for the current year.

Monday, August 22d.—Dr Richardson's Report.

Notwithstanding the ravages which have taken place among the various tribes of animals in North America, as the progress of civilization has advanced from east to west, it is still highly probable that no single species has yet become

extinct, and the colonist has still the means within his reach of studying the habits of every indigenous animal. As the genera of European and North American animals are for the most part the same, whilst a very great dissimilarity subsists between the species peculiar to the two continents, this affords considerable facility for promoting inquiries into the geographic distribution of particular types of animals. The observations of Dr Richardson in this report were confined to the distribution of the Mammalia and Aves; and chiefly those which were inhabitants of the western parts of North America, including New Mexico, the Peninsula of Florida and California, down to the well-defined limits of the South American zoological province. Dr Richardson then entered at considerable length into the description of the physical structure of the country under consideration, pointing out the more direct means of communication by transverse valleys, the course of streams, or extensive prairie lands, along which the quadrupeds, birds, or fish of distinct parts were enabled to perform their respective migrations; and he stated the great probability of a more complete interchange of the fish one day occurring, so soon as the several canals already projected, or in progress, should be completed. The eastern coast, at least in the more northern latitudes, has a decidedly lower mean temperature than the western, or than that of the eastern parts of Europe under the same parallels of latitude. In consequence of this, the migration of the birds is here more general than under the same parallels in Europe. Dr Richardson then entered upon several details connected with the subject of temperature.

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AVES.—Dr Richardson professed not to enter very fully into details respecting the different orders of birds, as the species were generally much more known than those of the Mammalia. Many of them being migratory, quitted the less accessible countries at stated periods of the year, and in passing through those tracts which were comparatively civilized, afforded the naturalist an opportunity of studying their habits. Their geographical distribution was still very imperfectly known, from the want of local lists, more especially in California and Russian America. About 500 species were now described, nearly one-fourth of which were common to Europe, and about one-eighth to South America. Of those common to North America and Europe, there were 39 land-birds, 28 waders, and 62 water-fowl. Several genera were confined to North America, but only two families, the Trochilidae and Psittacidae, were absent from Europe. The birds of prey in general have an extensive range, some of the North American species being found in the most distant parts of the world, others extend through South America, nearly half of them are common to Europe, if we except the vultures, of which those in the new world are peculiar to that country. Except the Corvidæ, of which one-fourth are also common to Europe, the rest of the North American land birds are for the most part restricted to that country, and two only out of the 62 Sylviadæ are found in Europe. Twenty-two species of Trochilus are described as natives of Mexico, but not one of the North American species has been met with in South America, although the family to which they belong is peculiarly characteristic of the ornithology of that country. In accounting for the causes which determined the migration of North American birds, Dr Richardson considered the spring movement intended for the purpose of finding suitable spots for breeding. The chief lines of route, he described as being mainly determined by the greater or less facility experienced in procuring food, from which circumstance the flights northwards and southwards often ex-

tended over very different lines of country. The physical structure of North America was also effective in determining three particular courses, along which these migrations occurred. The progress of civilization has already produced a decided effect in the migrations of some species, causing the starlings, for instance, to proceed further northward, as they are now secure of finding a provision in the corn-fields, where formerly they would have obtained no food. A table was then explained, in which were exhibited the total number of species hitherto known, with references to those which breed in Philadelphia, Massachusetts, and Susquehanna. He considered America to afford remarkable facilities for tracing the course of the different tribes in their migrations, and concluded his report by a notice of certain desiderata to our knowledge of North American zoology, which will be printed apart in the forthcoming volume of the Reports of the Association.

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Migratory Birds in 1836.—In the northern parts of England the effects and influence of season upon the movements of migratory birds, has been strongly exemplified during the present year. The cold and ungenial weather during the months of March, April, and May, delayed the arrival of most of our summer visitors from ten to fourteen days beyond the average period of their first appearance, as deduced from a journal annually kept for more than fifteen years. It was also generally remarked that they were much fewer in numbers, and that some species were altogether absent in localities where in previous years they had been abundant.

The departure of the *Sylvia*, as well as the *Hirundinæ*, on their equatorial movement, has also been unusually early, no doubt strongly influenced by the low temperature of the season.

Before the 1st of September the most of the Warblers had disappeared, a few individuals of *Sylvia trichilus* alone remaining till the 8th or 10th of that month, and after the 20th of September, more than a month before their accustomed time, the *Chimney Swallows* and *Martlets* had entirely disappeared. It is worthy of remark, that the Crossbill, whose summer migrations extends to higher latitudes, were observed in Northumberland as late as the 2d of May, at which time the eggs in the ovary of the female were some of them as large as peas.

The Fieldfare (*Merula pilaris*) one of our winter visitors, arrived in large flocks on the 24th and 25th of the present month, being a fortnight or more before the average time of its appearance.

An extraordinary deficiency of the insect tribe, particularly Coleoptera and Lepidoptera, has been generally noticed throughout the north of England and Scotland, during the spring and summer just passed.—P. J. S.

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MISCELLANEOUS.

BOTANICAL SOCIETY OF LONDON.—November 17, J. E. Gray, Esq. F. R. S. in the Chair.—A meeting of this Society took place at their new rooms, 11, John Street, Adelphi. Many donations of books and plants were announced, and thanks ordered to be returned. The laws as again revised,

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were submitted previous to their being printed, and distributed to the members, and it was understood they were to be confirmed at the anniversary meeting on the 29th November next, when also the other officers will be appointed.

VII.—On the advancement of Local Botany in the environs of London, with remarks relative to the Dispersion of Plants in that vicinity, and the formation of plans exhibiting the Distribution of Species over localities. By DANIEL COOPER, Curator to the Botanical Society of London, &c.

THE formation of the Botanical Society of London, and the publication of the Flora Metropolitana, or Botanical Rambles within thirty miles of London, have been the means of bringing forward numerous papers and plans, exhibiting the distribution of the localities of species in the directions frequented by the metropolitan botanist, and of advancing the objects of local Floras generally. No local Flora of the environs of so extensive a city, and, as will be presently shewn, producing species of so rare occurrence, having been published in a cheap and portable form,* induced me to attempt to arouse the minds of practical men towards the furtherance of this object.

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Several papers having been read before the Botanical Society of London on the distribution of the number of species in certain localities within a few miles of London, the results might perhaps be interesting to some of your readers. Mr Irvine* found 670 species within two miles of Hampstead, Middlesex, and 900 within the same distance of Croydon, Surrey. † Dr Macintyre‡ found 10 genera, including 23 species of ferns—65 genera, including 136 species of Monocotyledons,—and 265 genera, including 542 species of Dicotyledonous plants around Warley Common, Essex. I‡ have found 61 Natural Orders, 214 genera, including 406 species in Battersea Fields, Surrey—some of them of rare occurrence.

* Mr Irvine's paper was read, November 17, 1836.

† Dr Macintyre's paper was read, December 15, 1836.

‡ Paper read, January 5, 1837.

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History of Conchology.

REVIEWS AND CRITICAL ANALYSIS.

Manuel de Malacologie et de Conchyliologie. Par H. M. DUCROTAY DE BLAINVILLE. Paris, 1825. 8vo. with an Atlas of 100 Plates.

ed. A memoir was then read by A. Irvine, Esq. of Croydon, Surrey, on the importance of local botany. He stated that Mexico and the regions of the Andes are known to contain 6000 species, of which not 12 in number are found in Europe. He stated that 1500 species of flowering plants are to be found wild in Britain, of which about two-thirds are to be found within a circle of twenty-five miles round London, as mentioned in Cooper's *Flora Metropolitana*. (Mr Irvine has himself discovered 670 species within two miles of Hampstead, Middlesex. Within an equal distance of Croydon he has found no less than 900 different species, and he has reason to suppose many more grow within the same limits.) The species of vascular plants found in Great Britain comprise nearly all those growing in Lapland and Sweden, three-fourths of those growing in Germany, of which that country is estimated to contain about 2000 different species. The British plants comprise about three-fifths of those found in France, which amount to about 4000; the southern provinces bordering on the Mediterranean making a great addition to the number of the species. The Flora of the presidency of Madras, as hitherto published, contains 2800 species, but the whole of Hindostan is known to contain 8000.

Mr Irvine made some observations on the state of chemical botany, and stated that results of the utmost importance to the welfare of mankind, may be expected from further research into the dietetic and medicinal properties of plants. The meeting adjourned till 29th.

MAGAZINE

OF

ZOOLOGY AND BOTANY.

VOLUME SECOND.

W. H. LIZARS, EDINBURGH;
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W. CURRY, JUN. & CO., DUBLIN.
MDCCCXXXVIII.

Manuel de l'Histoire Naturelle des Mollusques et de leur Coquilles.
 Par M. SANDER RANG. Paris, 1829. 24mo.
The Genera of Recent and Fossil Shells; for the use of Students in Conchology and Geology. By GEORGE BRETTINGHAM SOWERBY.
 London, v. y. 8vo.
The Elements of modern Conchology; with Definitions of all the Tribes, Families, and Genera, Recent and Fossil. For the use of Students and Travellers. By WILLIAM SWAINSON, Esq.
 Lond. 1835. Duod.
Elements of Conchology, according to the Linnaean System, illustrated by 28 plates drawn from Nature. By the Rev. E. I. BURROW,
 A. M. F. L. S. Lond. 1836. 2d edit. 8vo.

THE foundations of Conchology were laid by Aristotle on those broad and rational views which characterize all his works on the Natural History of Animals, and which are worthy of his own reputation as a philosopher, and of the inquisitive and intelligent society to whom they were delivered. The structure and habits of the creatures embraced in this section of natural science were the main objects of his study, while their relations to the other animated entities by which they are surrounded, and their own mutual affinities were not forgotten, although undoubtedly the classification of them appears to have been considered a matter of secondary importance, and, such as it is, was rather forced upon him than invented to give some degree of method and generalization to the expression of the results of his inquiries. To censure this Father for the incompleteness, or even his want of a conchological system, is inconsiderately done, for it must be obvious that no system can be otherwise than defective and artificial until discovery has, in a long and lingering progress, collected together a large magazine of ma-

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terials, among which there shall at least be found a type of every modification of structure exhibited in the class. But in his age the number of Shells known was very confined, and to have advanced beyond the primary divisions of them into univalves, bivalves, and turbinated kinds, could be of no possible utility, and might have been hurtful to a further progress, for "the over early and peremptory reduction of knowledge into arts and methods" is an error from which, as Bacon has justly remarked, "time commonly receives small augmentation." * His views were higher, and his researches were pushed in the only direction in which they could be made available. He has left us a history of the Cephalopodes remarka-

ble for its fulness and accuracy, and equally remarkable for its exemption from the marvels and puerilities which disfigure the same history as delivered by his successors; and although there may be less of observation and fact in his account of the shelled molluscans, yet we find the same ends kept ever in view, and the incessant effort to attain his object by attention to the habits of the animals, and an examination of their anatomy. The numerous defects, obscurities, and errors which a vain criticism might readily detect in his details under both of these heads, are justly attributable to the accident of position, for he was the first to track the road without the guide of a fixed nomenclature, and without the light which analogy could lend,—anatomy at this period being scarcely practised, and physiology almost unknown. By his own researches he was enabled to characterize several groups of Testacea with some degree of precision, and to acquaint himself with many valuable particulars of their structure and economy, and although some of his general corollaries from these are hasty, yet even in this minor department of study the Stagyrite claims our admiration for his industry and sagacity, and our gratitude for giving us an example of scientific inquiry which it were well to follow.

But the spring which welled so pure and copiously had no issue to its waters. Aristotle had no successor in testaceology among his countrymen; and when literature fled the shores of Attica, and found its unwilling way to Rome, it was unattended by the natural sciences. In the constitution of society among the Romans, it is not difficult to find causes for their total neglect of natural history; and these operated with peculiar force when Pliny began to collect together the materials of his great encyclopædia. Devoted in an especial manner to a public life, the Romans were negligent of a

* Comp. Sprengel Hist. de la Médecine, Vol. i. p. 400.

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study, which, so far from enhancing their reputation with the people, required a comparative seclusion to be successfully pursued; while the disrelish for every science requiring a continuous and sober observation of facts and experiments was heightened, at the period we refer to, by a general luxury that had risen to an almost incredible pitch, and by the mental excitability produced by their foreign conquests and discoveries;—for the tales of their travellers, and the new and uncommon animals sent home from every quarter to supply the theatre and circus, had rendered the minds of the people—one and all—pliant to credulity, and apt to receive every monstrous tale, and equally indisposed to attend to the simple phe-

nomena displayed in the ordinary economy of animal life. Pliny largely participated the taste and credulity of his age, and hence his work is the very antitype of the Greeks,—ample in its details of the use and value of pearls and Tyrian purple, of anecdotes of the follies of the rich in their dress, and in their dishes of snails and oysters, &c.; while he caters from every source wonderful stories of the feats of gigantic cuttles, and of the surprising intelligence and habits of these and other molluscs which God verily hath made, in harmony with their lower organization, feeble of instinct and power. To Conchology as a science he has added nothing which Aristotle did not supply; but he furnishes some anecdotes for a chapter on its economical applications, and has graced its history with some tramontane and amusing fictions.

Of the ancients, Aristotle and Pliny are the only names which merit quotation in a history of conchology, and many centuries elapse before we again meet with one whose writings give some indication of its progress. The turmoil of society which accompanied and followed the decline and fall of the Roman Empire,—the engrossing nature of the religion and superstitions of the dark ages,—the exclusive attention bestowed on the writings of the ancients at the revival of letters,—and the higher claims of higher studies when civility and wealth had begun to diffuse a taste for original compositions, and gave encouragement and leisure to men of science and letters,—were all obliterative of a pursuit which was solely ornamental, and had no attraction except to those chosen few who found in the contemplation of Nature's works their principal gratification. That this number was not inconsiderable is certain, for otherwise it seems impossible to account for the publication of the voluminous and expensively illustrated books on natural history, which issued from the press within, or shortly after, the first century after the discovery of printing. And indeed the monastic system, and its

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institutions, must have been favourable to the growth of such feelings, giving the necessary leisure and seclusion, while nature, presenting daily her works and phenomena, and her seasonal changes to these recluses, dull but not dead to their influence, insensibly operated and gave direction to the employment of their minds. It may be that these earliest works were not devoted even in part to conchology, but Natural History as one never advances without advantage to every department, and even this minor branch had soon its due share of love and notice. The vast volumes of Albertus Magnus,* Rondeletius,† Gesner† and Aldrovandus‡ contain each of them books devoted to it, and although the original facts they

disclose are very few in proportion to the mass heaped up in their folios, yet the criticism they have often received as the receptacles of lumber rather than museums of well-arranged records, seems to be unnecessarily harsh and severe.

The study of the ancients, and the elucidation of their difficulties, was still a favourite object with men of literature, and when these early naturalists betook themselves to the writings which had come down to them rather than to the observation of things themselves, they but followed the bent of their compeers, and consulted the taste of their age. Their works are laborious compilations, in which every thing, however remotely connected with the subject in hand, good or bad, true or false,—whether recorded by grave philosopher, or sung or feigned by poet or traveller,—finds a place without any nicety as to its probability, or conformity to the organization of the animals. On the contrary, there is evidently a strong predilection in their worthy authors to retail and believe every tale of instinct or use which might raise the object, however low and loathly, in our estimation,—a greater love of the marvels of Pliny than of the sobrieties of Aristotle. Still with all their faults, the reader will find them not void of novelty, either in philosophical remark or in the record of new creatures; and the plan adopted by them of giving figures of the species was a most important step towards facilitating the progress of the science. To look for any thing that deserves the name of System in their works appears next to absurd: they evidently had not yet felt its want, and had no distinct idea of the necessity or utility of any beyond what gave a convenient heading to their chapters. What little they do give us of arrangement may be said to be literally borrowed from Aristotle.

The writings of this period afford good evidence of a growing and

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considerably extended taste for the contemplation of Shells, which was kept alive and diffused by the activity of a daily enlarging commerce furnishing, to collectors and amateurs, numerous novelties of uncommon forms and beauty to gratify, and at the same time to stimulate their curiosity. Hence also the origin of museums, of which Aldrovandus is usually said to have set the example; and of these Shells made a large and favourite part from their beauty and variety, and from the ease with which they were procured and preserved. These museums soon became rather numerous in Italy and Germany, and although they were undoubtedly formed more for the gratification of the taste of their owners, than with any views towards science, and hence arranged in fantastic and picturesque designs, still it is from their institution that we date the origin of Conchology

§ 1599.

† 1552.

† 1554.

* 1495.

as a separate branch of natural history. The catalogues published of a few of the most considerable of these museums are among the works generally enumerated as worthy of quotation in the history of Conchology, and it was the love of making collections of shells separately, that evidently gave origin to the works of Bonanni and Lister, the first which treated exclusively of these natural objects.

Bonanni's work was published in the year 1681, and from its title—"Recreatio Mentis et Oculi in observatione Animalium testaceorum"—was probably intended to be a book of luxury, exhibiting in its plates whatever amongst shells might please the eye or refocote the unoccupied mind. It is properly speaking, however, an introduction to Conchology, and in this view of it, the volume becomes interesting, since it affords the means by which the extent of the knowledge of Conchology at that period may be estimated.

Of the writings of his immediate predecessors he speaks very slightly: they remind him, he says, by their boastings when these are compared with their deeds, of those birds which floating aloft in the heavens draw notice by the amplitude of their spread of wing and the fulness of their plumage, but captured and plucked, the exility of their corpse proves to the sportsman how much he had been deceived! The treatise is divided into four parts: in the *first*, he proves, to his own satisfaction, that the study of shells is not a puerile but a wise and profitable occupation; investigates the mode of generation both of living and fossilized species; declares the fit materials from which they are formed, and takes occasion to talk learnedly of water, earths, nitre and petrifying humours; he descants on their colours, forms, and properties by which the Creator renders them visible to the privileged minds of philosophers; and lastly, enumerates their other uses to man, and what relates to them

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as precious ornaments for museums, of the more remarkable of which we have a particular account in his 12th chapter. In the *second* part Bonanni describes each shell separately, noticing their parts, form, colours, names, and the seas which they inhabit.—In the *third* part he propounds about 40 problems or hard questions, annexing reasons or "an argument" to the dark and doubtful, by which a ray of truth may be thrown on them, and they may be made visible at least to the mental eye; he shews that pearls cannot be formed from dew, as Pliny would persuade us, that they are not the young but a disease of conchs; he explains why a shell applied to the ear seems, by its murmurings, to lament its native sea; inquires into the causes of shells being more abundant in the sea than on the land, and especially in the Indian Ocean, where they are also more

beautifully pictured; why they are principally coloured on the exterior; wherefore they grow hard, seeing they are formed out of soft water; why they are twisted into many spires; why their snails have scarcely any diversity of members; why they are destitute of teeth, a heart, and bones; why nature denies them bile, and a liver and a spleen; why they grow lean on the wane of the moon; why they are slow and stoltish; why the juice of the Pholas is luminous at night; why among their various colours the cerulean is not to be found; and other such problems hitherto unargued or propounded,—not omitting to inquire learnedly whether the Remora, that stayed the ship sent from Periander on a cruel voyage to the Cape of Gnidos, was actually the shell called in consequence the Venus-shell, and "in regard whereof, the inhabitants of Gnidos doe honour and consecrate the said Porcellane within their temple of Venus."—The *fourth* and last part is occupied with the plates and figures described in the second, distributed into three classes, viz. the univalves not turbinate, the bivalves, and the turbinate univalves.

This slight outline of Bonanni's book is all our space will permit us to give, and is perhaps sufficient to enable the reader to appreciate its value, and the character of the writer. He was a Jesuit, with attainments and natural talents which, though respectable, certainly do not raise him above the level of his age,—perhaps he was under it,—better acquainted with the writings of his predecessors than of his contemporaries,—with the tastes of a virtuoso rather than of the man of science, skilful in all the vain logomachies of the schoolmen, and willing to give a ready assent to every thing which had ancient authority in its favour, but jealous and distrustful of all that was novel, and of every discovery that would carry knowledge forward. Hence we find his anatomy of shell-fish in-

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ferior to that of Aristotle's, and his arrangement of them the same; hence his advocacy of the doctrine of spontaneous generation, when his contemporary Redi had demonstrated its absurdity; hence his exclusive attention to the form and colour of shells to his total oversight of conchology as a branch of general physiology; hence also his fondness in propounding, his copiousness in solving occult questions which, if resolved, were of no utility, but which were really beyond the province of human inquiry; hence the discussion wherefore shellfish were defective in this and that organ, without the slightest effort to ascertain whether that deficiency was a fact; and hence, in short, the reason that his volume contains not a single fact additional to the stock of knowledge in his own province, for we do not find that he has "treated of the formation of shells in a

manner more philosophical than could have been expected at such a period," as Maton and Rackett have asserted. But we have no wish to depreciate Bonanni, who, as we have already mentioned, was a man of learning and repute, and it is not discreditable to an author that he is affirmed not to have anticipated his age: we have drawn his character as we think fairly, and it is a fair representation too, of the bulk of conchologists of his time, who obviously had little other object in the study than to indulge their love of virtuosity.

Philipppo Bonanni and Dr Martin Lister were co-equals in the date of the publication of their works,* but in character they were men of remote eras. Lister was not less learned than the Jesuit, but of that he made no parade, and if he had drunk of the logic of the schoolmen, his tutored mind had seen its folly, for we never find him indulging in disquisitions about things inscrutable or useless. Full of the medical knowledge of the day, Lister betook himself, following the bent of his genius, to a patient anatomy of the animals which tenant and construct the shells that had won his admiration, and, allowing for the state of anatomy then, we do not hesitate to say that his *Exercitationes* deserve to rank beside those of Poli and Cuvier. They are replete with accurate descriptions, not unmingled with error, and some things he had overlooked and mistaken, but to mark these as blots on his diligence or reputation were uncandid and unfair to him who leaves the olden ways and deviates into a new country, in which he has to open up the roads. In every page Lister proves himself a laborious and observant anatomist and naturalist; while his disquisitions and digressions relative to the leaning of his discoveries on the physiolo-

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gical questions which divided the then medical world afford the fullest proof of his acuteness, judgment, and extensive learning.* His works deserve the attentive perusal of every student in conchology, who will not fail to reap advantage from the task, even though he should go to it acquainted with the subject from recent authorities.

Lister was a true naturalist, and the first conchologist of decided eminence. His anatomical works show how clearly he understood that the structure of the animals was the main object of our study,—its only sure foundation, and its best claim on our attention,—but he was also very observant of the habits, instincts, and peculiarities of snail and shell, and was at the same time zealous to acquire an extensive and accurate knowledge of species, to which end he sacrificed much. At his own cost, and with the labour of

years, he completed and published a volume of plates, which is the pride of collectors, and is prized to this day for its utility. "His figures," Dr Maton and the Rev. Mr Rackett tell us, "both in point of number and faithfulness, are with reason still held in such high estimation, that no person attached to this branch of natural history can advance in it without the constant use of them, nor without finding them preferable for reference to many more splendid engravings which have succeeded them."†—"This admirable volume," says Dr Turton, "contains one thousand and fifty-five plates, besides twenty-one of anatomical figures, all drawn from original specimens by his two daughters, Susanna and Anna. Considering the state of natural science at the time this work was first issued, one hundred and thirty-three years since, it is impossible to contemplate this stupendous effort of genius and industry, without admiration at the grandeur of the design, and the correctness of its execution."‡

It was Lister's intention, after the publication of this volume of plates, to have proceeded with an anatomical description of every family or genus in its proper order, if God should grant him life and leisure, but from adverse health he was not permitted to do more than to anatomize the terrestrial slugs and snails, some freshwater Turbines, one or two of the marine Buccina, and a part of the Bivalves. The design was worthy of the man, and is a fine example of unwearied assiduity, which nought but a genuine enthusiasm

* His opinions relative to the functions of the liver in Mollusca appear deserving of more attention than they have yet received. See the *Exer. Anat. de Cochleis*, p. 79, &c.

† *Lin. Trans.* vii. p. 138.

‡ *Conchological Dictionary*, introd. p. xvi.

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could have kept alive. If perchance, says he, a stranger should be told that this man had devoted his years to the dissection of animals and snails, it might provoke his contempt or laughter, unless, indeed, the dissector was another Harvey, Malpighi, or a Redi; but I do not vehemently yearn for the applause of any one, having had my reward, for these exercises which were my pleasure and delight in youth, now that I am old they are my solace. And now when I am, from a failure of sight, compelled to use the microscope, and find that by its aid I can again enjoy myself in those studies, which have been long denied to the unassisted eye, I rejoice greatly.* We do love to dwell on the character of this man. Learned in his profession, and attaining its highest honours,—for he was physician to Queen Anne,—we now see him refocating his

physiologists appears to have been that the shells were organized parts of the animal, which grew and increased with the latter by receiving nutriment and material from the body; that there was in fact nothing peculiar in the formation of shell, but that its growth depended, like the growth of other parts, on the circulation of juices within itself, and on the assimilation and addition of new matter. Reaumur was never content with reasoning on a point which experiment alone could solve, and with his usual ability and success he instituted numerous experiments on the subject under review. They were principally made on land snails (*Helix*), but not restricted to them, for by confining fluviatile and marine species, both univalve and bivalve, in baskets framed so as to admit the water, and at the same time prevent the escape of the creatures, he was enabled to show that his theory was applicable to the whole class. He proved in this manner that the shell was enlarged by the deposition of calcareous matter to the edges of the aperture, and that this deposition was made in successive layers; that there was no increase from the intusception of calcareous matter, no additional increase from any action in the shell itself, but that the whole was a successive transudation from certain parts of the living tenant, to which the shell was an inorganic covering. It was objected to him that snails just issued from the egg had as many whorls as the parent, but the falsity of this observation was to Reaumur of easy proof 250

In indicating the progress of 'Method,' however, it is necessary to go back a little. We have seen that Aristotle had three orders of Testacea,—Univalves, Bivalves and the Turbinate,—but the class itself and these divisions were loosely defined; and the same vagueness is to be found in the writings of those authors who followed his method. Perhaps Dr Walter Charleton, Physician in Ordinary to Charles II. was the first who had a full conviction of the importance of system, but his attempt to arrange the Mollusca is very faulty.* The Limacæ he places with apodous insects; and aquatic animals being divided as usual into the sanguineous and exsanguineous, the remaining molluscs are arranged under two classes—viz. the *molliæ* or *molluscula* and the *testacea*. The first embraces all the cuttles and the *Lepus marinus* or *Aplysia*; the second the shelled tribes whose primary sections are the same as those of Aristotle's, while his genera, in general without definitions, rest on characters of little or no value. Jean-Daniel Major, Professor of Practical Medicine in the University of Keil, in the dutchy of Holstein, was the next to make the attempt, (1675,) which is pro-

* Onomastikon Zoikon. Lond. 1671. 4to.

* Exercit. Anat. des Cochleis, p. 2.

† See the Preface to the App. Hist. Anim. Ang.

* "De la Formation et de l'accroissement des Coquilles des Animaux tant terrestres qu'aquatiques, soit de mer soit de riviere," in Mem. de l'Acad. Roy. des Sc. 1709.

jaded spirits in the contemplation of his collections of shells, and enjoying, with a rapture which minds framed like his only feel, all their beauties and symmetries and singularities;—again we see him examining with a fatherly pride and pleasure the drawings which his daughters, who stand beside him, had laboured to finish before the duties of the day permitted their beloved parent to retire to his ease and study,—and at a more leisured season we see him, bent somewhat with age and infirmities,† anatomizing with the zeal and skill of his youth the creatures which he loved so well to study, now his keen eye kindling as the thought crosses him, that in this structure there was a ray which shed light on some obscurity in his own frame,—now lost in wonder at some display of a mechanism which can have but one author, while involuntarily he breathes the hymn,—“Oh altitudo! In his tam parvis, atque tam nullis, quæ ratio? quanta vis! quam inextricabilis perfectio!”

Lister then greatly advanced conchology by rescuing it from the charge of frivolity, by an unrivalled series of illustrations of species, by many novel remarks on their habits, by a very complete history of the species of his native land, and chiefly by giving us some excellent essays on the structure and physiology of the Mollusca which had been neglected since the time of Aristotle, for the isolated notices of a few species by Willis, Redi, Harderus, and Swammerdam, however good, had no influence on conchology, while those of Lister are epochal. He was fully aware too of the importance of system in this study, but he had not critically examined its real objects and use, and his classification, though elaborate, claims no praise of superiority. The *habitat* affords the character for his pri-

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mary divisions or books,—hence shells are divided into the land, fresh-water, marine bivalve, and marine univalve classes; and the mode in which these are subdivided more resembles the synoptical tables which the French botanists now frequently prefix to their floras, constructed without any regard to the affinities of the objects they approximate, and solely intended to hunt down a species, than what is usually understood by a system in natural history.

So far as we remember (for his works are not all of them by us, and years have elapsed since their perusal,) the manner in which the shell is formed, and its relation to the snail, occupied no part of Lister's investigations, but previous to his deacease the true solution of the problem was discovered by the illustrious Reaumur.* No experimental inquiry had hitherto been made on the subject, and the remarks in reference to it in conchological writers were scattered, vague, and hypothetical; while the opinion of better informed

nounced by two critics, to whose opinion much deference has been shown, to be "infinitely too complicated and ramifying to admit of any useful application." Sibbald, Grew, Bonanni, Lister, Langius, Hebenstreit, Tournefort, D'Argenville, and Klein are perhaps the principal who followed in their wake, but it is evident that they had all entered on their task without a previous study of what the real object and use of method was, what principles were to guide them in framing the various sections, or what the relative bearing of these divisions on one another should be. The division of shells primarily into Multivalve, Bivalve, and Univalve had perhaps superseded the Aristotelian, and many new divisions of secondary rate were of course invented, but they were arbitrary, founded on no common principle, either too lax or too complex to be applicable in practice, cumbersome to the memory, and clumsy in writing. To analyse

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these methods would be wearisome and unprofitable,—they were next to useless when promulgated, and have now no attraction even in the eyes of the pure conchologist. It is when we rise from their examination that we are in the best mood to appreciate the merits of Linnaeus, and feel inclined to nod in complacent assentation to all the peans which have been so often sung to his praise.

Linnaeus having, with a tact characteristic of his genius for system, divided invertebrated animals into two great classes—*Insecta* and *Vermes*,—was less happy in his reduction of the latter into their secondary groups or orders. The testaceous mollusca occupy one order by themselves, in which there are four sections of equal value—the multivalve, bivalve (*Cochleæ*), the univalves with a regular spire (*Cochleæ*), and the univalves without a regular spire.* In each section there are several genera defined with neat precision,—the characters of the multivalves being derived from the position of the valves,—of the bivalves from the number and structure of the hinge-teeth, or, in the absence of these, from a part influencing the opening of the valves,—of the *Cochleæ* from the unilocular or multilocular shell, but in most from the formation of the aperture; while in the last division the shape of the shell affords the means of discriminating them, excepting in *Teredo*, which is defined "T. intrusa ligno," in evident contrariety to his principles and his better custom. The naked tribes are placed in the order denominated "Mollusca," where they stand, in "admirable disorder," with radiated zoophytes, annelidans, parasitical worms, and the Echinodermata, which latter, however, are better in this strange miscellany, than they were when they stood either amongst simple or multivalved shells.

In estimating the merits of this system it is not fair to look back from our present vantage ground, and magnify its defects by a comparison with modern classifications: we are in candour to place ourselves behind its author, and looking forward, say how far his efforts have been useful or quickening.† Standing thus we trust to offend none of his admirers when we admit that there is nothing in its principle of a novel character: the soft mollusca were previously recognized and better assorted by Charleton; and every one of the sections, and, if

* The expounders of Linnaeus' system do not adopt this last division,—why it is difficult to say. By disregarding it they have injured the naturalness of the method.

† The first edition of the '*Systema Naturæ*' was published in 1735, but 1758 is properly the year which gave birth to his conchological system, when the 10th edition was published. It was perfected in 1766.

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we mistake not, of the genera also, of the shelled tribes had been already recognized. It labours under the censure of having too small regard to the animal, a censure in some degree just, for assuredly more was known of these than the definitions of the "*Systema*" would lead us to suppose; and it had still less regard to the position of the groups in reference to their organical affinities. It often associates species of dissimilar habits; and species are found in almost every genus at variance with the character of this, and where consequently the student ought not to have sought for them. The superiority of it lies in its simplicity; in the regulated subordination of all its parts; in the admirable sagacity with which the families or genera are limited; in the assumption of more stable characters for these, and for the clear distinct manner in which they are applied; in the suitableness of its nomenclature; in the invention of trivial names which gave a facility in writing hitherto unknown, and was a welcome relief to the memory; in the conciseness of the specific characters and the skill with which those characters were chosen; in the regular indication of the stations which the species occupy on the globe; and in the beauty of the more extended descriptions, and the peculiar felicity of language in which the thoughts suggested by any remarkable structure in the species under review are conveyed to us.

While the eyes of almost all were turned to this northern luminary for light to guide them in their pursuit, or as an object by barking at which a few drew notice on their littleness, Jussieu of Paris, the admirer of Linnaeus' genius and industry, and his correspondent, was explaining to his select but few disciples the princi-

ples of what has been commonly called the "Natural System." Jussieu's profound studies were confined to botany, but he had colleagues and contemporaries who attempted their application to conchology, and whose want of success is to be ascribed mainly to the meagreness of the anatomy of the mollusca then attained, to the fewness of the observations made on the living species, and in part also to the imperfection of the views of the authors. Daubenton, the colleague of Buffon, so early as 1743, insisted on a knowledge of the animal as necessary to form a natural classification of shells; and in 1756, Guettard, who was the personal friend of Jussieu, not only gave his sanction to this opinion, but shewed its practicability and excellence by defining, from the peculiarities of the animal and shell combined, a considerable number of the univalves, comprehending among these, in evident agreement with their relations, though contrary to general use, the slugs, the Aplysia, and the Bullæa. But the fullest attempt of this kind was made by Adanson, whose work on Senegal was published some years before Linnaeus had given the last revision to his system. Impelled by an indomitable enthusiasm, Adanson visited Senegal, under many disadvantages, to examine and describe the natural productions of a tropical climate; and for this purpose he made very extensive collections in every department of nature, but of his great work the first volume only, containing the outline of his travels and his account of the shells, was ever given to the public. The character of this volume has risen with the progress of the science, and it is more valued by the conchologists of the present day than it was by the contemporaries of its author.

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At a season when 'Systems' were all in vogue Adanson, with characteristic boldness, declared himself their enemy as being worse than useless, fit only to amuse triflers, certain to lead to error and alienate us from true views of the objects in question, and so easy of invention to boot that several equally good might be made by one of common experience and capacity. The history of conchology had already offered too many examples of the truth of this assertion, and he was not slack to give additional specimens in its illustration. But notwithstanding his philippick against them, Adanson, in some measure, forgot his own principles, and was little less of a systematist than those were whom he censured. Shell-fish were, according to him, distinguishable in the first place into "Limaçons" and "Conques;" the former were subdivided into univalves and operculated univalves, and the Conques into bivalves and multivalves; these primary families were still further divided into smaller groups from the position of the eyes in the Limaçons, and from the figure of the

respiratory tubes in the Conques. Now it was a pure arbitrariness in him to fix upon the operculum as a part or organ of primary value, for there is nothing in its use or position to justify the choice, nor did he attempt, by any analysis, to show that it was a regulator of structure and habits; and it was equally arbitrary to divide the bivalves into two sections on the mere existence of a few additional pieces over the hinge, for these pieces were not proved to be an index to the animal's economy. But Adanson's services to conchology are very great,—of those its labourers who have passed in review we place him next to Lister. He has the merit of having altogether removed from the Testacea the Lepas and Balani, whose structure he saw was modelled after the type of another category; his interesting discovery of the Vermetus was a fine illustration of the shell being of itself useless as a character in natural history; and his knowledge of affinities was made evident by the acuteness which lead him to approximate the Teredo to the Pholas. If not the first to point out the importance of the operculum, he was undoubtedly the first who knew its value as an index to natural relationship between genera; perhaps the first who was fully aware that the entireness or canal-

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culate formation of the aperture of the shell gave an insight into the habits of the snail in regard to food; the first too to point out fully the influence of age and sex in altering the shape of the shell, and more especially of its aperture; the first to describe and delineate the animal tenant of many genera; and although his attention was exclusively directed to external characters, yet we are above all indebted to him for his strong advocacy of the maxim that the anatomy of the animal was the sole sure foundation of a rational arrangement which had in view the mutual affinities of the objects it attempted to classify, and present them not fancifully commixed as they might be placed in a museum, but according to those characters which nature itself had given them of affinity or dissemblance. "There is then," he says, "in shell-fish something more to consider than their shells; the snail which tenants them ought to guide our methodical arrangements, to be our only regulator, since it is the principal part, that which gives to the exterior skeleton its form, size, hardness, colours, and all the other peculiarities in it which we admire. If we attentively examine this new and forgotten race, if we consider individually the members of it, we shall discover in their manners, in their actions, in their movements and manner of life, an infinitude of curious circumstances, of facts interesting and fitted to arrest the attention of every zealous and intelligent observer; we shall perceive in the organism of their bodies a great number of parts remarkable in their

structure and use ; and in entering into details we shall soon be compelled to grant that this study is no childish play, but as thorny and full of difficulties as any other in the wide range of natural history."

The example of Adanson was followed by Geoffroy who, in a history of the shells found in the vicinity of Paris, attempted to arrange them on the external anatomy of their animals ; and by Muller, who described in the same manner the mollusca of the north of Europe. The writings of Muller are still deservedly held in high estimation. They contain the descriptions of many novelties, and his descriptions of them, as well as of species previously known, are remarkable for their accuracy ; they are thickly strewn with notices of the external anatomy and habits of those he had examined alive ; and his style of writing is interesting, rising occasionally to eloquence.

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The first to raise us from this enchanted slumber was Cuvier. Before this great naturalist entered the field, Poli, a Neapolitan physician, had indeed anatomized with admirable skill the bivalved mollusca of his native shores, and had constructed a new arrangement of them from the characters of the animal alone, but partly from the political position of Europe, partly from the very expensive fashion in which Poli's work was published, and its consequent extremely limited circulation, and in part also from the partial application of his system and its didactic character, the erroneousness of his general views, and the novelty of his nomenclature,—we cannot trace its influence either as diffusive or propulsive of conchology.

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The determination of the class, its principal divisions and subdivisions, all repose upon my own observations, for the magnificent work of M. Poli aided me no further than by some descriptions, and some anatomies useful to my end, and these were confined to the multivalves and bivalves. I have verified all the facts which that able anatomist has furnished me, and, as I think, have determined with more accuracy the functions of some organs. I have also sought to characterize the animals to which the principal forms of shells belong, and to classify these in accordance with the organization of their inhabitants, leaving the ulterior divisions of them into genera and subgenera, to those who devote themselves in particular to this kind of work."

Did not our pages, on which we have already too much transgressed with this subject, forbid the attempt, we would gladly go on to trace the effects of Cuvier's example and views. It must suffice to say, that they raised the character of the conchologist, and gave a more philosophical tone to his pursuit ; they originated a new school, with better directed zeal, and a higher aim, and numbers became disciples when they saw

that here as much satisfaction and profit was to be reaped as in the study of almost any other class, for it may be laid down as an axiom that no branch of natural history, however apparently trifling, "but may be ennobled by the manner in which it is pursued ; and when the student carries all its wonders back to the one Great Source, the smallest worm and the most beautiful of his own species will afford him subjects for the deepest contemplation." For some years Cuvier's system, even in France, divided the favour of naturalists with the more artfully constructed one of Lamarck, remarkable for the precision and neatness of all its details, and its better adaptation to the purposes of the mere nomenclaturist ; and in Britain we knew little of Cuvier, until the peace of 1816 had restored a friendly correspondence between the men of science of Europe, and it was some years later still until his merits as a naturalist were appreciated, and his system began to weaken and dissolve our Linnæan prejudices. To indicate the modifications which this system has been made to undergo in the hands of Lamarck, Gray, Blainville, Oken, Latreille, &c. is here impossible ;—the same with the improvements proposed on the arrangement of the Cephalopodes and Brachiopodes by Owen, of the Pteropodes by Sander Rang, of the pulmoniferous Gastropodes by De Ferrussac, of the Bivalves by Deshayes, and of the shellless Acephales by Savigny. We must pass over in the same silence the

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I.—*Historical Notice of Antoine Laurent de Jussieu.* By M. AD. BRONGNIART.*

THE History of Science shows us that there are men who have been occupied during their whole life with a single idea, but that, an idea of great importance and fruitful in results—men who have exercised, even by works of apparently less extent than those of many other inquirers, a vital influence on the progress of science, because the works which they produce are often the base of the edifice which their contemporaries and successors only serve to complete.

Such may be said to be the case with the individual to whose memory the following pages are devoted ; an individual celebrated throughout the scientific world, and venerated by every one who knew him. It may be affirmed that all his reputation was acquired by the publication of a single volume : his preceding works were only a prelude to this, and those that followed merely the development of it ; and, notwithstanding their importance, every one will

* Translated from the *Annales des Sciences Naturelles*, Tom. septième, Jan. 1837.

• Regne Animal, i. Pref. p. xxvi.

acknowledge that they were not necessary to add to the fame of the author of the *Genera Plantarum secundum ordines naturales disposita*. This unique volume contains the most profound exposition of the whole vegetable kingdom, and is as remarkable for the excellence of its principles as the perfection of its details.

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It may only be remarked that Linné, aware of the imperfect knowledge which could be obtained in his time respecting the natural classification of plants, had appended to his method, under the title of *vagæ et etiamnum incertæ sedis*, a considerable series of genera either little known, or whose position appeared to him doubtful; while Adanson, in the belief that his method was infallible, attempted to classify them all, and this pretension to outstrip the knowledge of his time was perhaps the cause of many of the im-

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perfect alliances he has been led to form. It would be unjust, at the same time, not to acknowledge that there is to be found, in many parts of his work, the indication of affinities previously overlooked, and which he very happily perceived.

While Adanson was engaged in these complicated labours to arrive at the natural method, Bernard de Jussieu, examining nature with a sagacity which may be judged of from the few memoirs he has published, established the principles of this method, not in a book, but by nature itself, namely, in a series of plants in the garden of Trianon, or in a still more perspicuous manner, in the catalogues used in the formation of that garden; for the manuscript lists he has left, the most complete of which has been published at the head of the *Genera* of Antoine Laurent de Jussieu, indicate the position of many genera, which at that period were not cultivated in gardens.

It is sufficient to compare this simple list with the attempts at a natural method by Linné and Adanson, to see how much it is superior to both, and what a profound knowledge and sagacity it implies in this learned botanist, whom Linné was pleased to designate as one of the masters of the science. As a proof of this, upwards of two-thirds of the groups established by Bernard de Jussieu have remained untouched, notwithstanding the progress of botany, or have only been subdivided, without these subdivisions being disjoined from each other. The examination of the genera united in each of these families, as well as the series which he has established, shows that Bernard de Jussieu had assumed as a character of the first order, presenting no real exception, the structure of the embryos, acotyledon, monocotyledon and dicotyledon; for it is evi-

dent that the few instances where he has included in the same family, plants differing in this particular, result from the still imperfect knowledge which we possess of the nature and structure of fruits.

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The lists used in his demonstrations, worn out by use, often renewed, covered with notes and additions, and at last presenting not only the list of the genera and species cultivated, but the characters of the families and most frequently those of the genera concisely and perspicuously indicated,—all shew that these eleven years were diligently employed in bringing his natural method nearer to perfection. From the year 1770, Bernard de Jussieu, now 71 years of age, ceased entirely to take any charge of the garden, which he wholly entrusted to his nephew; his health, and particularly his sight, became feeble, and in 1777, after having experienced several attacks of apoplexy, he finished his long career—a career which had in reality so much influence on the progress of botany, although in appearance it had been productive of little.

A comparison of dates will suffice to show what portions of the natural method, as explained in the *Genera Plantarum* of 1789, are due to Bernard de Jussieu, and what to his nephew. The arrangement at Trianon, formed in 1759, proves that the classification of the families according to the cotyledons and the insertion of the stamens, is due to Bernard de Jussieu; Antoine-Laurent de Jussieu, while studying this series, and receiving his early botanical education from his uncle, probably drew up the first principles of the science; but every thing proves that the influence of Bernard de Jussieu on the works of his nephew is limited to this.

In fact, Bernard de Jussieu's three note-books relative to the order of the garden at Trianon, contain not a single character either of the classes, families, or genera; there is not even an indication of any of the classes except those of the Monocotyledones and Dicotyledones. In his notes on the cards we find some generic characters accompanied with sketches of the section of the seed; but these cards, carefully preserved by his family, are far from numerous.

Finally, the oldest notes used in his demonstrations by Antoine-Laurent, bear the characters of the families, which are not found in any of those belonging to Bernard.

Thus the first principles of the classification are due to Bernard de Jussieu, but the profound and sagacious application of these principles and the true institution of the natural families are to be ascribed to Laurent.

I.—*The Fauna of Twizell.* By P. J. SELBY, Esq. (Continued from Vol. i. p. 424.)

From the circumscribed extent, as well as the natural features of the district described, the list of birds is necessarily very limited in species belonging to the Grallatorial and Natatorial orders, but contains a fair ordinary average of Insectorial as well as Rapacious and Gallinaceous birds. In front stands the great sea eagle, (H. albicilla,) as I have twice had the gratification of seeing this noble bird wing its way across the district on its route from the coast to the interior. Scarcely a winter indeed passes without one or more individuals being seen in some part of the county; and during one season three of these birds almost daily frequented Chillingham Park, the seat of the Earl of Tankerville, where they were observed to prey upon the fallen deer. These visitors, it may be observed, are generally immature birds; but as no eyrie at present exists, either in Northumberland or in the south of Scotland, they are probably the offspring of some of those pairs which are yet to be seen in the northern districts and islands of Scotland, and which, in defiance of the assiduity and daring of the shepherd and Highland fox-hunter, continue at times to rear their young in some precipitous and inaccessible rock, or else upon the islets of its little frequented lochs. These, when able to provide for themselves, are driven from the place of their nativity by their parents, who allow of no compeer within their peculiar beat, and in their search of a domain of their own pay us these passing visits. The peregrine

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falcon is still occasionally seen, but its appearance is now rarer than it used to be a few years ago. This may be attributed to the destruction of two or three eyries in the adjacent districts, one of which was placed in the remains of the tower at Dunstanborough Castle, and another in a craggy precipice upon a moor, about three miles to the south-west of Twizell. Eyries, however, of this falcon still exist in some of the precipitous gullies of the Cheviot range, and in the lofty rocks of the magnificent promontory of St Abbs Head. The merlin breeds, but sparingly upon the neighbouring moors; and for three or four successive seasons a pair had their nest within a stone's throw of our little district. The increase of sheep stock, and extended cultivation, is annually tending to diminish the numbers of this, as well as many other birds which formerly used to abound.

The kestrel, as well as the sparrow-hawk, annually breeds with

us, the former in a crag in the Dean, or else in the old nest of a carrion crow; the latter is always its own architect, though it does not excel in the art, as the nest is a large flat fabric, loosely constructed of twigs and sticks, with a very trifling central depression. The sparrow-hawk has frequently as many as six young ones, and the havoc they make at this time among the smaller birds and young game is almost beyond belief. I recollect inspecting a nest in which lay the recent remains of a lapwing, a blackbird, a thrush, and two green-linnets, some half devoured, and others nearly whole, but all neatly and cleanly plucked. The common as well as the rough-legged buzzard are only occasional visitants, and the first is perhaps of even rarer occurrence than the latter, but neither species has been seen for the last two years.

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List of birds, &c. found and observed upon Twizell:

AVES.

FALCONIDÆ.

Haliastur albicilla, Sav.

Falco peregrinus, Gmel.

— *assalon*, Gmel.

— *tinunculus*, Linn.

Accipiter fringillarius, Ray.

Buteo vulgaris, Bechst.

— *lagopus*, Flem.

Pernis apivorus, Cuv.

Circus rufus, Briss.

— *cyaneus*, Flem.

STRATIDÆ.

Otus vulgaris, Flem.

— *brachyotos*, Flem.

Strix flammea, Linn.

Ula stridula, Selb.

N. Tengmalmi?

INSESSORES.

DENTIROSTRES.

Lanius excubitor, Linn.

Muscicapa grisola, Linn.

— *luctuosa*, Temm.

Merula viscivora, Selb.

— *pilaris*, Selb.

— *musica*, Selb.

— *iliaca*, Selb.

— *vulgaris*, Selb.

Merula torquata, Selb.

Cinclus aquaticus, Bechst.

Salicaria locustella, Selb.

— *phragmitis*, Selb.

Curruca atricapilla, Bechst.

— *hortensis*, Bechst.

— *cinerea*, Bechst.

Saxicola cinerula, Bechst.

— *rubetra*, Bechst.

— *rubicola*, Bechst.

Eritræa rubecula, Swains.

Phœnicura rutilica, Swains.

Sylvia sibilatrix, Bechst.

— *trochilus*, Lath.

— *rufa*, Temm.

Regulus auricapillus, Selb.

Parus major, Linn.

— *ceruleus*, Linn.

— *palustris*, Linn.

— *ater*, Linn.

— *caudatus*, Linn.

Accentor modularis, Cuv.

Motacilla alba, Linn.

— *boarula*, Linn.

Anthus pratensis, Bechst.

— *arvensis*, Bechst.

Bombicilla garrula, Buonap.

CONTROSTRES.

Alauda arvensis, Linn.

Emberiza miliaria, Linn.

— *schoeniclus*, Linn.

— *citrinella*, Linn.

Plectrophanes nivalis, Meyer.

Fringilla cœlebs, Linn.

— *montifringilla*, Linn.

Passer domestica, Ray.

Linaria cannabina, Sw.

— *minor*, Ray.

— *chloris*, Swain.

Carduelis spinus, Steph.

— *elegans*, Steph.

Pyrrhula vulgaris, Temm.

Loxia curvirostra, Linn.

Sturnus vulgaris, Linn.

Corvus corax, Linn.

— *corone*, Linn.

— *cornix*, Linn.

— *frugilegus*, Linn.

— *monedula*, Linn.

Pica melanoleuca, Vieill.

Garrulus glandarius, Flem.

SCANSORES.

Picus major, Linn.

Certhia familiaris, Linn.

Troglodytes Europæus, Selb.

Cuculus canorus, Linn.

FISSIROSTRES.

Alcedo ispida, Linn.

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Hirundo rustica, Linn.
 ——— *urbica*, Linn.
 ——— *riparia*, Linn.
Cypselus apus, Flem.
Caprimulgus Europæus, Linn.
 RASORES.
Columba palumbus, Linn.
Phasianus colchicus, Linn. and
torquatus, Temm.
Tetrao tetrax, Linn.
Lagopus Scoticus, Selb.
Perdix cinerea, Briss.
 GRALLATORES.
Ardea cinerea, Lath.
Numenius arquata, Lath.
Totanus ochropus, Temm.
 ——— *hypoleucos*, Temm.
Scolopax rusticola, Linn.

Scolopax gallinago, Linn.
 ——— *gallinula*, Linn.
Rallus aquaticus, Linn.
Crex pratensis, Bechst.
 ——— *porzana*, Selb.
Gallinula chloropus, Lath.
Vanellus cristatus, Meyer.
Charadrius pluvialis, Linn.
 ——— *morinellus*, Linn.
 NATATOIRES.
Anser segetum, and *ferus*, Flem.
Anas boschas, Linn.
 ——— *crecca*, Linn.
Clangula vulgaris, Flem.
Podiceps minor, Lath.
Larus canus, Linn.
 ——— *ridibundus*, Linn.
 ——— *fuscus*, Linn.

REPTILIA.

SAURIA.
Lacertidæ.
Lacerta agilis, Flem.
 OPHIDIA.
Anguidæ.
Anguis fragilis, Linn.
Serpentidæ.
Pelias berus, Buonap. *Vipera*
communis, Jenyns.

PISCES.

OSSEL.
Acanthopterygii.
Gasterosteus aculeatus, Linn.
Malacopterygii.
Abdominales.
Cyprinidæ.

AMPHIBIA.
Caducibranchia.
Ranidæ.
Rana temporaria, Linn.
Bufo vulgaris, Flem.
Salamandridæ.
Triton palustris, Flem.
 ——— *aquaticus*, Flem.
Leuciscus phoxinus, Yarr.
Cobitis barbatula, Linn.
Salmonidæ.
Salmo fario, Linn.
 ——— *eriox*, Linn.
 ——— *trutta*, Linn.

REVISED THROUGHOUT, AND CONSIDERABLY ENLARGED; WITH A TRANSLATION
 OF THE PROSE EDDA FROM THE ORIGINAL OLD NORSE TEXT;
 AND NOTES CRITICAL AND EXPLANATORY,

BY I. A. BLACKWELL, ESQ.

TO WHICH IS ADDED,

AN ABSTRACT OF THE EYRBYGGJA SAGA,

By Sir Walter Scott.

LONDON.

HENRY G. BOHN, YORK STREET, COVENT GARDEN.

1847.

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Baldur was another son of Odin, wise, eloquent, and endowed with such great majesty that his very glances were bright and shining. Tyr, who must be distinguished from Thor, was also a warrior deity, and the protector of champions and brave men*. Bragi presided over eloquence and poetry. His wife, named Iduna, had the care of certain apples, which the gods tasted when they found themselves grow old, and which had the power of instantly restoring them to youth.

Heimdall was their porter. The gods had made a bridge between heaven and earth; this bridge is the rainbow. Heimdall was employed to watch at one of the extremities of this bridge, for fear the giants should make use of it to get into heaven. It was a difficult matter to surprise him; for the gods had given him the faculty of sleeping more lightly than a bird, and of discovering objects by day or night farther than the distance of a hundred leagues. He had also an ear so fine that he could hear the very grass grow in the meadows and the wool on the backs of the sheep. He carried in the one hand a sword, and in the other a trumpet, the sound of which could be heard through all the worlds. I suppress here the names of the other gods, who made up the number of twelve; but I ought to bestow a word upon Loki, whom the ancient Scandinavians seem to have regarded as their evil principle, and whom, notwithstanding, they ranked among the gods.

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and so back to the left again, which was the manner of the early Greeks, and had its name from the resemblance to a furrow traced by the plough*. [The greater part of the ancient monuments written in the Runic character, which are still preserved, are inscriptions dispersed here and there in the fields, and cut out on large stones or pieces of rock. The Scandinavians wrote also on wood and on the bark of the birch-tree.] As for the manuscripts in the Runic character, the most ancient we can find appear to have been written some time after Christianity took place in the north, as is judged from several proofs, particularly from the frequent intermixture of Roman letters in them. In the tenth and eleventh centuries the runic gave way still more and more to the other; till at length the missionaries succeeded in totally abolishing the use of them, as tending to retain the people in their ancient superstitions. But this reformation did not speedily take place, and there remained traces of this character for many succeeding ages; nor, as we are assured†, is it yet wholly laid aside among the mountaineers of one province in

NORTHERN ANTIQUITIES ;

OR,

AN HISTORICAL ACCOUNT OF THE MANNERS, CUSTOMS, RELIGION
 AND LAWS, MARITIME EXPEDITIONS AND DISCOVERIES,
 LANGUAGE AND LITERATURE

OF THE

ANCIENT SCANDINAVIANS,

(DANES, SWEDES, NORWEGIANS AND ICELANDERS.)

WITH INCIDENTAL NOTICES RESPECTING OUR SAXON ANCESTORS.

TRANSLATED FROM THE FRENCH OF M. MALLET,

BY BISHOP PERCY.

NEW EDITION,

Sweden.

[Upwards of a thousand Runic inscriptions have been discovered in Sweden, and three or four hundred in Denmark and Norway, but few of them are of a date prior to the eleventh century, and there is scarcely one of undoubted authenticity that throws the least light on history. They are, in fact, singularly devoid of interest, and by no means repay the trouble taken by the learned men of the north to decipher them. By far the greater number of these inscriptions are short epitaphs on tombstones, raised after the introduction of Christianity by obscure individuals, in memory of their friends and relations. N. N. set (raised) this stone after (in memory of) N. N. his father, mother, brother, sister, or friend, would be, by the insertion of two ordinary Scandinavian proper names, such as Suti, Steinar, Olaf, &c., a literal translation of the greater part of them. (The most interesting Runic inscription we have yet seen is that on the Kingiktorsoak stone which we shall give an account of in the next chapter.)

* Βουαρδοφιδν.

† See Dalin. Su. Rik. hist. tom. i. p. 237, and Benzell. collect. hist. p. 1, cap. 1.

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The Runic, like the ancient Greek alphabet, originally contained only sixteen letters, arranged as follows:—

Name . .	fe	úr	thurs	ós	reið
Signification	money	a ure-ox	a giant	an estuary	a ride
Figure . .	ƒ	ᚢ	ᚦ	ᚠ	ᚱ
Power . .	F	U	D.TH	O	R

Name . .	Kön	hagl	nauð	ís	ár	sól
Signification	an ulcer	hail	need	ice	year	the sun
Figure . .	ƿ	*	ᚢ	ᚠ	ᚠ	ᚱ
Power . .	K	H	N	I	A	S

Name . .	Týr	björk	lögr	maʒr	ýr
Signification	the God Tyr	a birch tree	a lake	a man	a bow
Figure . .	ᚢ	ᚢ	ᚦ	Y	ᚱ
Power . .	T	B	L	M	Y

We will not fatigue the reader by entering into a critical examination of the conflicting theories that have been brought forward to account for the origin of these characters, for notwithstanding the antiquarian lore by which many of them are supported, they have only served to involve the question they were intended to elucidate in still greater obscurity. Leaving, therefore, these erudite lucubrations to those who may have the curiosity to investigate them*, we shall give, as briefly as possible, a few well authenticated facts on the subject. It may, in the first place, be taken for granted that the Scandinavian Runic alphabet was in use in the ninth century. It is, moreover, highly probable that the Saxons also possessed a Runic alphabet previous to their invasion of England, for it has been clearly ascertained that the Anglo-Saxons were acquainted with Runic letters when they adopted the Roman

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alphabet on their conversion to Christianity in the sixth century, as they retained two of them—þ th and ƿ w—that expressed sounds in their language which could only have been

inadequately rendered by a combination of two or more of the Roman characters*. Hrabanus Maurus, an archbishop of Mainz, in the ninth century, has given in his work, "De Inventione Linguarum," a Runic alphabet, which he says was used by the Marcomanni for magical purposes; and another German Runic alphabet has been found in a vellum MS., of the tenth century, in the convent of St. Gallen, in Switzerland; but William Grimm has shown† that these are only modifications of the Anglo-Saxon Runes, though he is of opinion that the alphabet of Hrabanus Maurus may probably be that used by the Nordalbingian Saxons prior to their invasion of England, as well as by several other Germanic tribes. That the Germans were accustomed to write on wooden tablets in Runic characters, is proved by the authority of Venantius Fortunatus, a bishop of Poitiers of the sixth century, who, in one of his epistles to his friend Flavius, tells him that when he is tired of the Latin, he can make use of the Hebrew, Greek, or even of the Runic letters.

"Barbara fraxineis pingatur runa tabellis;
Quodque papyrus agit, virgula plana valet,"

are the words which the poetical bishop makes use of, and by which he meant to designate the German, and not the Scandi-

* The so-called Anglo-Saxon characters, except the two mentioned in the text, are a mere corruption of the Roman, and ought to be abandoned. Rask very properly made use of Roman letters for his excellent Anglo-Saxon grammar, observing that he did so, "after mature deliberation, the written Anglo-Saxon characters as they appear in MSS. being themselves a barbarous, monkish corruption of the Roman, and the printed ones a very imperfect imitation of the MSS. To persist, therefore, in the use of them, (however venerable their appearance,) seems to be without good reason; for though called Anglo-Saxon, they are no other than those employed at the same time in the writing of Latin; if, therefore, we should be consistent, we ought to employ types to represent every variation of the monkish characters throughout the middle ages; as the handwriting underwent many changes before the discovery of printing, and the restoration of the Roman alphabet."

† Preface, page 55.
† In his compendious work, entitled "Ueber Deutsche Runen," Götting. 1821.

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navian Runes, as is evident from several other passages in which allusion is made to his travels in Germany. Grimm has further shown, in the most clear and satisfactory manner, that the Anglo-Saxon Runic alphabet was derived from the Scandinavian at a period when it had only sixteen letters, the complementary letters of the two alphabets having been formed on principles that offer not the slightest analogy.

Hence we may safely infer that the Scandinavians were acquainted with Runic letters in the sixth century, and, in all probability, at a much earlier period, though it is certainly very extraordinary that they should have made so little use of them. Grimm, after having established by the most conclusive arguments the facts above stated, attempts to trace the sixteen original Runes* to a remote Asiatic source, founding his conjectures on their inadequacy to express all the sounds of the Old Norse language, and therefore assuming that they must necessarily have been borrowed from a more primitive tongue.

* Not having as yet met with a satisfactory etymology of the word Rune, we will not give that generally adopted, as it is probably the most erroneous of all, but merely observe that the Norse *ú* corresponds to the German *au*, and that the famous root *nandragora* or rather the demon conjured out of it, is designated in old German by the word *alraun*. See Will. Grimm's Deutsche Runen, p. 67, and Jacob Grimm's Deutsche Mythologie, p. 376.

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In 1824, a stone was found in the island of Kingiktorsoak, in lat. 72° 54', long. 50° west of Greenwich, bearing a Runic

inscription, which was submitted to Finn Magnúsen, Professor Rask, and Dr. Brynjulvson of Iceland; and these celebrated Runologists, without any communication on the subject having passed between them, respectively arrived at the same interpretation of the characters, except the last six, which Professor Rask and Finn Magnúsen at length agreed meant the numerals MCXXXV; Dr. Brynjulvson contenting himself with expressing an opinion that they might be mere ornaments, but that, from the form of the other characters, he should deem the inscription to be of the twelfth century. These gentlemen gave the inscription as follows:—

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ELLIGR · SIGVATHS · SON : R · OK · BJANNE : TORTARSON :
OK : ENRITHI · ODDSSON : LAUKARDAK · IN : FYRIR GAKNDAG
HLOTHV · VARDATE · OK RYDU : MCXXXV.

which, in correct Norse, would be

"Erlingr Sighvatsson, ok Bjarni Thórðarson, ok Eindriði Oddsson, laugardaginn fyrir gagnaðag, hlöðu varða thessa (vel theнна,) ok ruddu; MCXXXV.

In English:

Erling Sighvatsson, and Bjarni Thordasson, and Eindrid Oddsson, on Saturday before *Gangday*, raised these marks and cleared the ground, 1135.

We subjoin a woodcut of the Kingiktorsoak stone, copied from the *Antiquitates Americanae*.



Professor Rafn derives *gagnaðagr*, from *gagn*, victory, and *dagr* a day—the day of victory; and observes that the Icelanders gave this appellation to two festivals of the church, one falling on the 14th of May, the other on the 25th of April, or Ascension Day, which was popularly termed *gagnaðagrinn eini*, and *hin mikli*; the unique and the great day of (spiritual) victory. Ascension week was celebrated in Catholic times with peculiar solemnity; the priests, accompanied by the people, going in procession with lighted torches, and sprinkling holy water round the churches. It was no doubt from this going, or *ganging*, in procession, that the three

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days before Ascension Day were called, in Anglo Saxon, *gang dagas*, and in old Scotch, *gang dayis*. Björn Haldorson in his Icelandic dictionary, renders them by *gagnaðagar*, vel *gangaðagar*, the latter being, no doubt, the more popular appellation. Be this as it may, the meaning of the inscription is, that in the twelfth century—and if we admit Professor Rask's interpretation of the last six Runic characters—in 1135, on the Saturday, either before April 25th or May 14th—in all probability the former—three Northmen cleared the ground, and set up marks or mounds, some vestiges of which were observed on the spot where the stone was found, to show that they had taken possession of the land—probably of the whole island. This would indicate an inten-

tion of settling there, and they must at all events have passed the winter in this high latitude, Baffin's Bay being unnavigable at so early a season. The discovery of this Runic stone has thus made us acquainted with the singular fact that Northmen explored the Polar Seas, and wintered in these icebound regions, seven centuries previous to the expeditions of Captains Parry and Ross, and that, too, without being furnished with any of the numerous comforts and conveniences of a modern outfit.

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CHAPTER IV.

ICELANDIC LITERATURE.

Our limits only allow us to give a mere sketch of the literature of Iceland in the olden time. We shall regard it as naturally falling into the three divisions of Eddaic, Skaldic, and Saga literature, and say a few words respecting each:

EDDAIC LITERATURE.

There are two works which bear the title of Edda, the one in verse, the other in prose. The Poetic, or Elder Edda*,

* Various derivations have been given of the word Edda, which in Old Norse signifies simply, *great grandmother*, in which sense it is used in the *Rigs-mál*. In M. Gothic *atta* is used for father, and *aithci* for mother. Sæmund's Edda was quite unknown to the learned world until the seventeenth century, when the celebrated Torfæus received a MS. containing

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consists of thirty nine poems, which were collected by Sæmund Sigfusson, (n. 1057. ob. 1131,) surnamed the Learned, towards the latter end of the eleventh or the beginning of the twelfth century. Sæmund, after pursuing his classical and theological studies in the universities of France and Germany, became, on his return to Iceland, the parish priest of Oddi, a village situated at the foot of Mount Hekla, and which had belonged to his family from the time of the first colonization of the island, and where he seems to have devoted himself with great zeal to the cultivation of letters and the education of youth. Some writers maintain, though without being able to adduce the slightest evidence in support of their arguments, that Sæmund merely transcribed the Eddaic poems from Runic manuscripts, or Runic staves; but the most probable conjecture seems to be that he collected them from oral tradition, though he may possibly have found some of the most important amongst them in manuscripts written in Roman characters, shortly after the introduction of Christianity.

The Eddaic poems may be classified as follows:—1. The Mythic-cosmogonic. 2. The Mythic-ethnologic. 3. The Ethic. 4. The Mythological. 5. The Mythic-heroic. 6. The Miscellaneous. One of them—the *Sólar-ljóð*—was probably composed by Sæmund himself, as it is the only one that contains the least allusion to Christianity*. All the others, especially the Mythic-cosmogonic poems, bear internal evidence that entitles them to the claim of a much higher antiquity than the eleventh century.

The Mythic-cosmogonic poems are the *Völuspá*, the *Vafthrúdnis-mál*, and the *Grimnis-mál*. The *Völu*, or *Völo-spá*—a compound word, signifying *The Song of the Prophetess*†,—

it from Iceland. Resenius gave two of the poems in the first edition of the Prose Edda, published in 1665, but we have now a complete edition of all the poems, with notes and glossaries, in 3 volumes, 4to., published by the Arni-Magnæan Commission at Copenhagen, the 1st volume in 1787, the 2nd in 1818, and the 3rd, which is provided with an excellent "*Lexicon Mythologicum*" by Finn Magnúsen, in 1828.

* With the exception of a couplet in the thirteenth strophe of the *Grougaldur*, in which mention is made of the (magical) evil to be apprehended from the dead body of a Christian woman, "*Kristin dauð kona*," and perhaps also one or two obscure allusions in the mythic-heroic poems.

† *Scoticæ Valh's spæe*.—See the Glossary to the Prose Edda. All the

Teutonic nations appear to have had their Valas or prophetesses; Cæsar remarks, i. 50, that "apud Germanos ea consuetudo esset, ut matres familias

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OF NIGHT AND DAY.

10. "A giant called Njörvi," continued Har, "who dwelt in Jötunheim, had a daughter called Night (Nött) who, like all her race, was of a dark and swarthy complexion. She was first wedded to a man called Naglfari, and had by him a son named Aud, and afterwards to another man called Annar, by whom she had a daughter called Earth (Jörd). She then espoused Delling, of the Æsir race, and their son was Day, (Dagr) a child light and beauteous like his father. Then took All-father, Night, and Day, her son, and gave them two horses and two cars, and set them up in the heavens that they might drive successively one after the other, each in twelve hours' time, round the world. Night rides first on her horse called Hrimfaxi, that every morn, as he ends his course, bedews the earth with the foam that falls from his bit. The

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horse made use of by Day is named Skinfaxi, from whose mane is shed light over the earth and the heavens" [L].

PETRIFACTIONS AND THEIR TEACHINGS:

OR,

A HAND-BOOK

TO THE GALLERY OF ORGANIC REMAINS

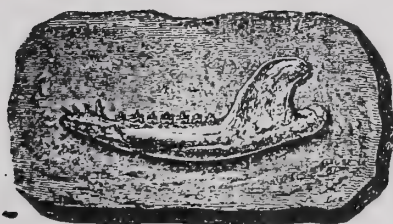
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The British Museum.

BY

GIDEON ALGERNON MANTELL, ESQ. LL.D. F.R.S.

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"THE MEDALS OF CREATION," "THE WONDERS OF GEOLOGY,"
"THOUGHTS ON ANIMALCULES,"
ETC.



JAW OF A MAMMALIAN QUADRUPE, IN OOLITIC LIMESTONE, FROM STONEFIELD
Page 403.

"Grand monuments of Nature, which mark the past revolutions of the Globe."
Mr H. Deay.

WITH NUMEROUS ILLUSTRATIONS.

LONDON:

HENRY G. BOHN, YORK STREET, COVENT GARDEN.

MDCCCLII.

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PETRIFACTIONS AND THEIR TEACHINGS. CHAP. V.

consist of the mineralized osseous skeleton. Deposits of mud or fine detritus, of whatever age, appear to have been most favourable for the preservation of the dermal integuments; hence we often find in the pulverulent clays and marls of the Tertiary strata, and in the Chalk of England and Westphalia, and in the fine lithographic stone of Solenhofen, fishes, perfect in form, and not only individuals, but groups, with the scales, fins, head, teeth, and even the capsule of the eye, in their original juxtaposition. In Chalk, some of the fishes occur with the body uncompressed, and as entire, as if the original had been surrounded by soft plaster of Paris while floating in the water. But in coarse limestones and conglomerates—in other words, in materials that have been subjected to the action of the waves and torrents—detached teeth, scales, bones, &c. constitute the principal vestiges of this class of beings.¹

The cartilaginous or osseous nature of the skeleton, and the number and position of the fins, were the characters formerly employed in the classification of Fishes; but M. Agassiz, conceiving the structure of the skin to afford a natural index to the essential modifications of organization and functions, with great sagacity adopted an arrangement founded upon the form and structure of the scales, and divided the whole class into four orders, each distinguished by essential differences in the dermal (*skin*) system.

To the geologist this method has proved of inestimable value; for it is simple, easy of application, and, so far as our present knowledge extends, may be relied upon as affording accurate conclusions as to the nature and relations of the originals, to which a few detached fossil scales may have belonged. Another important aid has been derived from the microscopical examination of the structure of the teeth; a department of palæontological investigation, which is yet but partially explored.

The living species of Fishes exceed eight thousand, and those found in a fossil state, and determined by M. Agassiz, already amount to upwards of two thousand, while several hundreds are still undescribed, and the rapid progress of geological research is continually adding to the number. The

¹ See "Medals of Creation." chap. IV.

ROOM V. AGASSIZ'S CLASSIFICATION OF FISHES.

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British species form a large proportion of the Ichthyolites illustrated and described by M. Agassiz; and fortunately, in our eminent Ichthyologist, Sir Philip Grey Egerton, Bart. we have an able and zealous cultivator of this branch of Palæontology.¹

AGASSIZ'S CLASSIFICATION OF FISHES.—The four orders into which the class PISCES is divided by M. Agassiz, are founded on the following characters:—

Order I. PLACOID (from *πλατῆ*, a broad plate).—The skin covered irregularly with enamelled plates, sometimes of a large size, but frequently in small points, as the shagreen on the dermal integument of the *Sharks*, and the tubercles of the *Rays*. *Lign.* 82, fig. 4, a dermal spine from the skin of a Ray.

Order II. GANOID (*γάνος*, splendour, from the brilliant surface of the enamel).—The scales are of an angular form, and composed of plates of horn or bone, covered with a thick layer of enamel, a structure which is identical with that of their teeth. The *Sturgeon* is a living example of this order. *Lign.* 82, fig. 3, is a fossil scale of a fish of this division, the *Lepidotus*.

Order III. CTEROID (*κτελς*, a comb).—The scales are formed of plates, which are toothed or pectinated on



EXPLORATION

OF THE

RED RIVER OF LOUISIANA,

IN THE YEAR 1852:

BY

RANDOLPH B. MARCY,

CAPTAIN FIFTH INFANTRY U. S. ARMY;

ASSISTED BY

GEORGE B. McCLELLAN,

DEPUTY CAPTAIN U. S. ENGINEERS.

WITH REPORTS ON THE NATURAL HISTORY OF THE COUNTRY,
AND NUMEROUS ILLUSTRATIONS.

WASHINGTON:
ROBERT ARMSTRONG, PUBLIC PRINTER.

1853.

We have seen numerous bear tracks within the past two days; and occasionally the animals themselves, two of which we killed. Several that we saw, however, escaped; and we had frequent occasion to regret the loss of our bear-dog, as we might have killed many more with his assistance.

John Bull, who still continued to ride the same fractious horse which he had in the buffalo hunt, made a brush with a large bear to-day, but did not succeed in getting alongside of him, as the horse became perfectly mad and unmanageable the moment he got sight of the bear. This is often the case; and there are but few horses that can be made to approach one of these animals.

Several anecdotes, which were related to me by our guide, concerning the habits of the black bear, would seem to entitle him to a higher position in the scale of animal instinct and sagacity than that of almost any other quadruped. For instance, he says that before making his bed to lie down, the animal invariably goes several hundred yards with the wind, at a distance from his first track. Should an enemy now come upon his track, he must approach him with the wind; and with the bear's keen sense of smell, he is almost certain to be made aware of his presence, and has time to escape before he is himself seen.

He also states that when pursued, the bear sometimes takes refuge in caves in the earth or rocks, where the hunter often endeavors, by making a smoke at the entrance, to force him out; but it not unfrequently happens, that instead of coming out when the smoke becomes too oppressive, he very deliberately advances to the fire, and with his fore feet beats upon it until it is extinguished, then retreats into the cave. This he assured me he had seen often. Although these statements would seem to endow bruin with something more than mere animal instinct, and evince a conception of the connexion between cause and effect, yet another anecdote which was related to me would go to prove this curious quadruped one of the most stupid fellows in the brute creation.

My informant says, that when the bear cannot be driven out of the cave by smoke, it sometimes becomes necessary for the hunter to take his rifle, and with a torch to enter the cavern in search of him. One would suppose this a very hazardous undertaking, and that the animal would soon eject the presumptuous intruder; but, on the contrary, as soon as he sees the light approaching, he sits upright on his haunches, and with his fore paws covers his face and eyes, and remains in this position until the light is removed. Thus the hunter is enabled to approach as close as he desires without danger, and taking deadly aim with his faithful rifle, poor bruin is slain. These facts have been

ANTELOPE AND DEER—WITCHITA MOUNTAINS IN SIGHT—REACH BUFFALO CREEK—
VALLEY OF OTTER CREEK—SALUBRITY OF CLIMATE—DEER ELEAT—HORSE-FLIES—
SCOURVY—WITCHITA MOUNTAINS—PASS THROUGH THE MOUNTAINS—BUFFALO SEEN.

July 8.—Our train was in motion again at 2 o'clock this morning, and our road led us over very elevated table-lands, near the dividing ridge of the two branches of the river, where the country is totally destitute of wood or water, and altogether devoid of interest until reaching this place, where we find a few small ponds of wretched water and a clump of trees.

In addition to four deer and two antelopes that have been killed by our party to-day, our grayhounds have contributed another deer to our larder.

We have had several good opportunities since we have been upon the plains of witnessing the relative speed of the different animals found here, and our observations have confirmed the opinion I have before advanced. For example, the grayhounds have upon several different occasions run down and captured the deer and the prairie rabbits, which are also considered very fleet; but although they have had very many races with the antelope under favorable circumstances, yet they have never in one instance been able to overtake them; on the contrary, the longer the chase has continued, the greater has been the distance between them. The *Cervus Virginianus* (our red deer) has generally been considered the fleetest animal upon the continent after the horse, but the *Antilocapra Americana*, or prong-horned antelope of the plains, is very much swifter.

One of our hunters, who has been in advance of our camp, says he obtained a distant view of the Wichita mountains, and that he has also discovered several telegraphic smokes in a northeasterly direction.

July 9.—Getting under way at 2 o'clock this morning, we journeyed over the elevated prairie in a northeast course towards the dividing ridge, and on coming upon the crest of this elevation, some of the most lofty peaks at the western extremity of the Wichita chain of mountains showed themselves in the distance, like smoky clouds against the background of the murky sky near the horizon. Crossing over the ridge, we made for the head of a creek, where we expected to find good water, but upon reaching it we found the gypsum rocks, and, as usual, the

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water exceedingly bitter, and wholly unfit for use. After travelling down this creek for four miles, we encamped at a small pond, containing a liquid which we were obliged to make use of, but it had more the

appearance of the drainings from a stable-yard than water.

We find more timber upon the borders of this stream than we have seen since leaving Sweet-water creek; it consists of china, hackberry, cotton-wood, and mulberry. The grass is luxuriant, and the vegetation of the valley has a smiling and verdant aspect, that marks the fertility of the soil.

Four deer have been killed to-day—two of which I was so fortunate as to add to my list: one was also caught by the grayhounds. They have afforded us much and rare sport by frequent chases, of which the smooth prairie has afforded us a good view.

It is a most beautiful spectacle to mark the slender and graceful figures of the hounds as they strain every muscle to its utmost tension in their eager and rapid pursuit of the panic-stricken deer. It is a contest between two of the fleetest and most graceful and beautiful quadrupeds in existence: the one has his life at stake, and the other is animated by all that eager enthusiasm which is characteristic of a thorough-breed animal. They both put forth all the energies with which the Author of their being has endowed them, and seem to fly over the wavy undulations of the plains. Now they are upon the summit of one of these swells, and the startled animal has disappeared in an adjoining ravine, and for a moment the hounds are at fault; but soon they espy him panting up the opposite acclivity, when they are off again like the wind, in hot pursuit, and, rapidly closing upon their devoted victim, they are soon engaged in the death struggle. This sport is most intensely exciting, and he who would not become interested in it would hardly be entitled to claim consanguinity with the great family of Nimrod.

163 APPENDIX D.

GEOLOGY.

NOTES UPON THE SPECIMENS OF ROCKS AND MINERALS COLLECTED: BY EDWARD HITCHCOCK, PRESIDENT OF AMHERST COLLEGE.

DEAR SIR: I have done what I could with the specimens you put into my hands from the Red river; but I must confess, that while these specimens, with the sections and notes by Dr. Shumard and yourself, have disclosed some interesting and valuable substances, I have found it impossible to solve several questions of importance for the want of more specimens, especially fossils. Without these, you are aware, the tertiary and secondary formations cannot be identified with any degree of certainty. Yet the whole number of species sent me does not exceed half

a dozen, and several of these are so mutilated that their specific character cannot be determined. The two most important formations pointed out in your notes, and in the sections, are the gypsum deposit and that of coal; yet from the former there is not in the collection more than one species of fossil, and from the latter no specimen whatever; so that the exact place in the geological scale of these two formations is in a great measure conjectural.*

But notwithstanding these deficiencies, we do get from the specimens, and your notes, glimpses of several very valuable facts. The four most important points in your discoveries are gypsum, copper, gold, and coal. Perhaps I cannot bring out my views upon these and other points better than by describing the specimens in the order of your march, except where that was doubled upon itself. Where I can do it, and think it of any service, I shall designate by colors, upon the map of your route which you placed in my hands, the most important deposits.

At your starting point, Fort Belknap, on the Brazos river, you mention a fact of the deepest interest, viz: the occurrence of "large beds of bituminous coal."

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The only deposits of gypsum known to me that are more extensive than the one discovered by you, are in South America. All along the western side of the Cordilleras, especially in Chili, and interstratified with red sandstone and calcareous slate, beds of gypsum occur of enormous thickness, some of them not less than six thousand feet. It has been tilted up and metamorphosed greatly by igneous agency of ancient date, but seems to be of the age of the lower cretaceous rocks. Mr. Darwin, to whose admirable work on the geology of South America I am indebted for these facts, has traced this deposit at least five hundred miles from north to south, (it is not many miles—sometimes, however, twenty or thirty—in width,) and thinks it extends five hundred more; and perhaps much further. He also describes thin beds of gypsum in the tertiary strata of Patagonia and Chili, which are some eleven hundred miles in extent. This gypsum is generally more or less crystalline, and corresponds much better in lithological characters with that in Texas, than does the metamorphic gypsum of the Cordilleras. Mr. Darwin is of opinion, however, that the latter was originally deposited in a manner analogous to the former, viz: by means of submarine volcanoes and the conjoint action of the ocean. Very probably the ancient igneous agency which we have described in the Wichita mountains, and along a line southerly to the Rio Grande, may have been connected with the production of the gypseous deposit in the same region.

The specimens of this gypsum put into my hands correspond with your descriptions. One of them, of snowy whiteness and compact, it

seems to me, might answer for delicate gypsaceous alabaster, so extensively wrought in other lands for ornamental purposes. The selenite was regarded among the ancients as the most delicate variety of alabaster, and was employed by the wealthy, and in palaces, for windows, under the name of *Phengites*. It has the curious property of enabling a person within the house to see all that passes abroad, while those abroad cannot see what is passing within. Hence Nero employed it in his palace. If the splendid plates which you describe occur in any considerable quantity, it may hereafter be of commercial value, as it certainly will be of mineralogical interest.

THE

PHYSICAL GEOGRAPHY

OF

THE SEA.

BY M. F. MAURY, LL.D.,
LIEUT. U. S. NAVY.

SECOND EDITION, ENLARGED AND IMPROVED.

NEW YORK:

HARPER & BROTHERS, PUBLISHERS,

339 & 331 PEARL STREET,
FRANKLIN SQUARE.

1855.

436. The development of this law certainly was an achievement, for it enabled us to show that the depth of the sea at the places named (§ 428) was not as great as reports made it. These researches were interesting; the problem in hand was important, and it deserved every effort that ingenuity could suggest for reducing it to a satisfactory solution.

437. As yet, no specimens of the bottom had been brought up. The line was too small, the shot was too heavy, and it could not be weighed. In this state of the case, Passed Midshipman J. M. Brooke, United States Navy, who, at the time, was associated with me on duty at the Observatory, proposed a contrivance by which the shot, on striking the bottom, would detach itself from the line, and send up a specimen of the bottom. This beautiful contrivance, called Brooke's Deep-sea Sounding Apparatus, is represented in Plates II. and III. opposite.

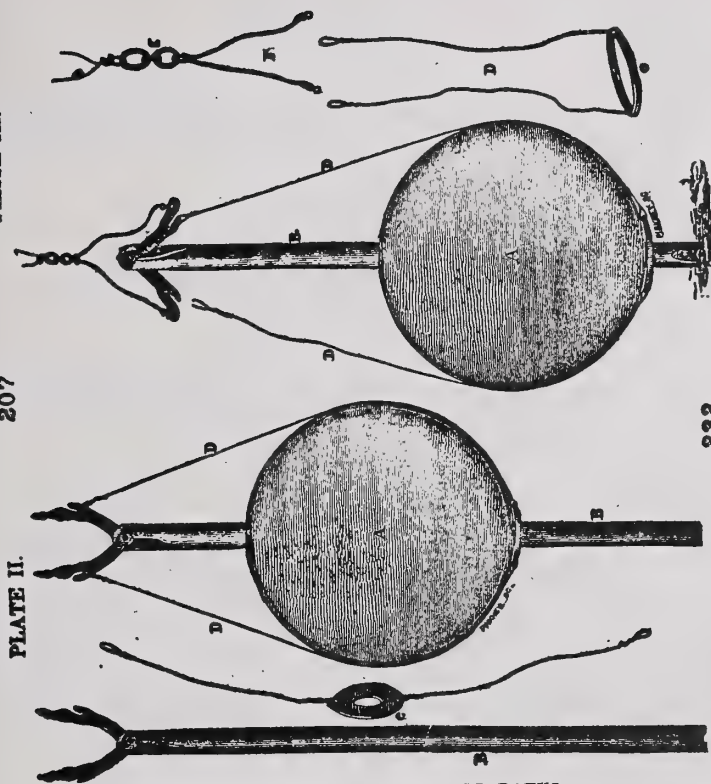
438. The greatest depths at which the bottom of the sea has been reached with the plummet are in the North Atlantic Ocean, and the places where it has been fathomed do not show it to be deeper than twenty-five thousand feet.

The deepest place in this ocean (Plate XI.) is probably between the parallels of 35° and 40° north latitude, and immediately to the

southward of the Grand Banks of Newfoundland. No satisfactory deep-sea soundings, either in the Pacific or Indian Oceans, have as yet been made by those who are co-operating in this admirable plan of research.* A few have been made in the South Atlantic, but not enough to justify deduction as to its depths or the shape of its floor.

* Since the above was written, I have received a letter from Captain Ringgold, commanding the Surveying Expedition in the Pacific, informing me that, on his way out, he had obtained, in the southern hemisphere, a deep-sea sounding, with bottom at the depth of eight thousand fathoms. The notes and details of this cast have not yet been received.

495. In seeking information concerning the climates of the ocean, it is well not to forget this remarkable contrast between its climatology and that of the land, viz.: on the land, February and August are considered the coldest and the hottest months; but to



BROOKE'S DEEP-SEA SOUNDING APPARATUS.

the inhabitants of the sea, the annual extremes of cold and heat occur in the months of March and September. On the dry land, after the winter "is past and gone," the solid parts of the earth continue to receive from the sun more heat in the day than they radiate at night, consequently there is an accumulation of caloric, which continues to increase until August. The summer is now at its height; for, with the close of this month, the solid parts of the earth's crust and the atmosphere above begin to dispense with their heat faster than the rays of the sun can impart fresh supplies, and, consequently, the climates which they regulate grow cooler and cooler until the dead of winter again.

496. But at sea a different rule seems to prevail. Its waters are the store-houses in which the surplus heat of summer is stored away against the severity of winter, and its waters continue to grow warmer for a month after the weather on shore has begun to get cool. This brings the highest temperature to the sea in September, the lowest in March.

THE

TESTIMONY OF THE ROCKS;

OR,

GEOLOGY IN ITS BEARINGS

ON THE

TWO THEOLOGIES, NATURAL AND REVEALED.

BY

HUGH MILLER,

AUTHOR OF "THE OLD RED SANDSTONE," "FOOTPRINTS OF THE
CREATOR," ETC., ETC.

WITH

MEMORIALS OF THE DEATH AND CHARACTER OF THE AUTHOR.

"Thou shalt be in league with the stones of the field."—JON.

BOSTON:

GOULD AND LINCOLN,

59 WASHINGTON STREET.

NEW YORK: SHELDON, BLAKEMAN & CO.

CINCINNATI: GEORGE S. BLANCHARD.

1857.

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I have already referred to the sombre, unproductive character of the earliest terrestrial flora with which we are acquainted. It was a flora unfitted, apparently, for the support of either graminivorous bird or herbivorous quadruped. The singularly profuse vegetation of the Coal Measures was, with all its wild luxuriance, of a resembling cast. So far as appears, neither flock nor herd could have lived on its greenest and richest plains; nor does even the flora of the Oolite seem to have been in the least suited for the purposes of the shepherd or herdsman. Not until we enter on the Tertiary periods do we find floras amid which man might have profitably labored as a dresser of gardens, a tiller of fields, or a keeper of flocks and herds. Nay, there are whole orders and families of plants of the very first importance to man which do not appear until late in even the Tertiary ages.

Some degree of doubt must always attach to merely negative evidence; but Agassiz, a geologist whose statements must be received with respect by every student of the science, finds reason to conclude that the order of the Rosaceæ,—an order more important to the gardener than almost any other, and to which the apple, the pear, the quince, the cherry, the plum, the peach, the apricot, the victorine, the almond, the raspberry, the strawberry, and the various brambleberries belong, together with all the roses and the potentillas,—was introduced only a short time previous to the appearance of man. And the true grasses,—a still more important order, which, as the corn-bearing plants of the agriculturist, feed at the present time at least two thirds of the human species, and in their humbler varieties form the staple food of the grazing animals,—scarce appear in the fossil state at all. They are peculiarly plants of the human period.

Let me instance one other family of which the fossil bot-

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anist has not yet succeeded in finding any trace in even the Tertiary deposits, and which appears to have been specially created for the gratification of human sense. Unlike the Rosaceæ, it exhibits no rich blow of color, or tempting show of luscious fruit;—it does not appeal very directly to either the sense of taste or of sight: but it is richly odoriferous; and, though deemed somewhat out of place in the garden for the last century and more, it enters largely into the composition of some of our most fashionable perfumes. I refer to the *Labiæ* family,—a family to which the lavenders, the mints, the thymes, and the hyssops belong, with basil, rosemary, and marjorum,—all plants of "gray renown," as Shenstone happily remarks in his description of the herbal of his "Schoolmistress."

"Herbs too she knew, and well of each could speak,
That in her garden sipped the silvery dew,
Where no vain flower disclosed a gaudy streak,
But herbs for use and physic not a few,
Of gray renown within those borders grew.
The tufted basil, pun-provoking thyme,
And fragrant balm, and sage of sober hue.

* * * * *

"And marjorum sweet in shepherd's posie found,
And lavender, whose spikes of azure bloom
Shall be erewhile in arid bundles bound,
To lurk amid her labors of the loom,
And crown her kerchiefs clean with meikle rare perfume.

"And here trim rosemary, that whilom crowned
The daintiest garden of the proudest peer,
Ere, driven from its envied site, it found
A sacred shelter for its branches here,
Where, edged with gold, its glittering skirts appear,
With horehound gray, and mint of softer green."

THE

GALLERY OF NATURE

OR

WONDERS

OF THE

EARTH AND THE HEAVENS

BY

THOMAS MILNER, A.M. F.R.G.S.

WITH A LARGE AMOUNT OF INTERESTING INFORMATION FROM

SIR CHARLES LYELL, A.M., F.R.S.; WILLIAM BUCKLAND, D.D.; JAMES D. DANA, A.M.; EDWARD HITCHCOCK, D.D., LL.D.; THOMAS DICK, LL.D.; GIDEON MANTELL, LL.D., F.R.S.; BARON A. VON HUMBOLDT; AND OTHER TRAVELLERS AND NATURALISTS.

CONDENSED AND REVISED

BY CALEB WRIGHT, A.M.,

AUTHOR OF "TRAVELS IN INDIA," ETC.

EMBELLISHED WITH THIRTY-TWO FULL PAGE ILLUSTRATIONS.

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VOLUME I. [1855]

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Water is usually to be found in sufficient quantities for the use of the natives, although the land is so low and flat. They dig wells five to ten feet deep in any part of the dry islets, and generally obtain a constant supply. These wells are sometimes fenced around with special care; and the houses of the villages, as at Fakaafu, are often clustered about them. The Tarawan Islands are generally provided with a supply sufficient for bathing, and each native takes his morning bath in fresh water—esteemed by them a great luxury.

The only source of this water is the rains, which, percolating through the loose surface, settle upon the hardened coral rock that forms the basis of the island. As the soil is white, or nearly so, it receives heat but slowly, and there is consequently but little evaporation of the water that is once absorbed.

An occasional log drifts to their shores, and at some of the more isolated atolls, where the natives are ignorant of any land but the spot they inhabit, they are deemed direct gifts from a propitiated deity. These drift logs were noticed by Kotzebue, at the Marshall Islands, and he remarked also that they often brought stones in their roots. Similar facts have been observed at the Tarawan group, and also at Enderby's Island and elsewhere.

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The stones at the Tarawan Islands are generally basaltic, and they are highly valued for whetstones, pestles, and hatchets. The logs are claimed by the chiefs for canoes. Some of the logs on Enderby's Island were forty feet long, and four in diameter.

The language of the natives indicates their poverty, as well as the limited productions and unvarying features of the land. All words like those for "mountain," "hill," "river," and many of the implements of their ancestors, as well as the trees and other vegetation of the land from which they are derived, are lost to them; and as words are but signs for ideas, they have fallen off in general intelligence. It would be an interesting inquiry for the philosopher, to what extent a race of men placed in such circumstances are capable of mental improvement. Perhaps the query might be best answered by another: How

many of the various arts of civilized life could exist in a land where shells are the only cutting instruments — the plants in all but twenty-nine in number — but a single mineral — quadrupeds none, with the exception of foreign mice — fresh water barely enough for household purposes — no streams, nor mountains, nor hills? How much of the poetry or literature of Europe would be intelligible to persons whose ideas had expanded only to the limits of a coral island — who had never conceived of a surface of land above half a mile in breadth — of a slope higher than a beach — of a change of seasons beyond a variation in the prevalence of rains? What elevation in morals should be expected upon a contracted islet, so readily over-peopled that threatened starvation drives to infanticide, and tends to cultivate the extreme selfishness? Assuredly there is not a more unfavorable spot for moral or intellectual development in the wide world than the coral island, with all its beauty of grove and lake.

MOUNTAIN PEAKS 128

They bear, therefore, much the same proportion to the terrestrial spheroid as the little risings on the coat of an orange to the fruit. Books of travels abound with conflicting statements respecting the distance from which particular mountains may be seen. The length of the line of visibility is not only influenced by conditions of the atmosphere, but by the character of projections, apart from their height. The Peak of Teneriffe is not so frequently visible at the same distance as those tops of the Andes which are of corresponding elevation, not being, like them, invested with perpetual snow. Humboldt remarks, that the cone of the former no doubt reflects a great degree of light on account of the white color of the pumice with which it is covered; but its height does not form a twenty-second part of the total elevation, and the sides of the mountain are coated with blocks of dark-colored lava, or with luxuriant vegetation, the masses of which reflect little light, the leaves of the trees being separated by shadows of grater extent than the illuminated parts. He refers, therefore, the Peak to that class of mountains which are seen at a great distance only in a negative manner, or because they intercept the light transmitted

from the extreme limits of the atmosphere. Still, it has been observed at the distance of one hundred and twenty-four, one hundred and thirty-one, and even one hundred and thirty-eight miles; and the summit of Mauna-Loa, in the Sandwich Islands, has been seen, at a period when it was destitute of snow, skirting the horizon from the distance of one hundred and eighty-three miles. This is the most remarkable example yet known of the visibility of high land; and as Mauna-Loa was negatively seen, both cases refute the theory of Bouguer, that

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mountains seen negatively cannot be perceived at distances exceeding one hundred and twenty-one miles.

A slight survey of the features of the external world is sufficient to show that the tendency of their general arrangement is to minister to the happiness of man, to give him pleasure in the act of contemplation, as well as to contribute to his convenience. Its surface, so finely diversified, is eminently calculated for the gratification of its occupiers, and expands around them in every clime an array of beauty and grandeur, sometimes apart from each other, but often blended in wild yet tasteful and imposing combinations. Wherever the traveller penetrates, he finds the terrestrial configuration so arranged in ever-varying outline as to spread before him an inviting picture of natural scenery, which captivates, or soothes, or elevates, or excites the mind, and furnishes such pleasurable emotions as dull uniformity would not have yielded. Especially do the elevations which mark the face of the earth, whether rising to the stately proportion of mountains, or forming only the rounded, green-clad hill, give interest, grace, or sublimity to the landscape. But the mountains perform a more important office than that of giving imposing effect and picturesque beauty to the scenery of the earth. Occupying a portion of its surface nearly equal to that which the sandy desert claims, they stand associated with political and other results of the highest importance to mankind. Where the ocean does not extend its waters to divide the families, kindreds, and tongues of the human race, the granite snow-crowned rampart is frequently the line of demarcation.

The snow of these high regions consists, as already stated, of small round balls, resembling small shot. This at once shows that this snow is very different from that of the lower countries, where the snow falls in flakes. This difference is also proved by the fact, that it is impossible to press it together so as to make a snowball. The German peasants in Switzerland have well observed this difference, and express it in their language, calling the mountain snow *firn*, in contradistinction to *snow*. As no snowball can be made of this kind of snow, it is evident that none of the snow avalanches can originate on the snow fields, though that opinion has been entertained up to very recent times. At and near the surface of the snow fields the snow particles are disunited, and do not adhere to one another; but at some depth it is found that they change in some degree their form, becoming more flattened. In this form they approach closer to one another, and being pressed by the superincumbent stratum, they by degrees unite into one mass, which has a resemblance to the ice of which the glaciers are composed. When the mountain mass on which the snow rests is not much raised above the snow line, this change in its form begins to take place at a depth of a few feet below the surface; but where the mountains rise to twelve thousand feet, or four thousand feet above that line, the snow preserves

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its granular form to a great depth, so that only the lower stratum assumes the appearance of ice.

The difference between the snow of the lower countries and that of these elevated regions shows that they must be formed under different circumstances. It is easy to comprehend that only a small mass of aqueous vapor can ascend into the rarefied air which rises above the summits of the snow mountains. Rain of course does not fall, as all vapors rising to that elevation are converted into snow. The summits of the mountains are, besides, above the region in which rain is generated. Heavy rain clouds are only seen to hover over those declivities of the mountains which are overgrown with large trees. The region of the forests extends in the Alps from three thousand

to six thousand feet above the sea level, and in this region rain in summer and snow in winter are very abundant. Where the trees disappear, and are replaced by bushes, the quantity of rain decreases gradually, and goes on decreasing in approaching the snow line. Above this line only snow falls, not in the form of flakes, but in that of very minute globules. The quantity of snow which falls in spring and autumn is not great; in winter it is still smaller, and in summer snow does not fall at all. It appears, therefore, that the whole annual quantity of snow in that elevated region is but small, which is a wise arrangement of Providence, as otherwise the snow would accumulate to an immense extent, and to such a height, that it would be impossible to pass the mountains. For these masses do not experience any diminution, except by evaporation, and it is evident that in such a rarefied air, and in such a cold climate, evaporation cannot but be very small.

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This majestic confusion receives a peculiar charm from the bluish color with which the ruptures of the icy masses are tinged. At many places the masses are furrowed by clefts several feet wide, which descend to a depth of a hundred feet and more. These clefts are numerous, where the snow masses, in descending over a very steep slope, or into a deep ravine, have been fractured by their own weight; and they are still more numerous where an unwieldy mass, hemmed in between two mountains, in protruding downward to form a glacier, has not found a space large enough to preserve its width, and thus has been broken along its edges by the resistance offered by the rocks on its sides, or by the rapid declivity of the valley into which it descends.

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Nations have thus been kept apart from each other by natural boundaries; and the difficulties connected with aggressive wars between communities thus separated have contributed to promote peace and maintain independence. The mountains also give their aid to the clouds of heaven, attracting them to their summits, and storing up their precipitated waters in interior reservoirs, from whence they issue . . .

CRANIA AMERICANA;
 OR,
 A COMPARATIVE VIEW
 OF THE
 SKULLS OF VARIOUS ABORIGINAL NATIONS
 OF
 NORTH AND SOUTH AMERICA:

TO WHICH IS PREFIXED
 AN ESSAY ON THE VARIETIES OF THE HUMAN SPECIES.

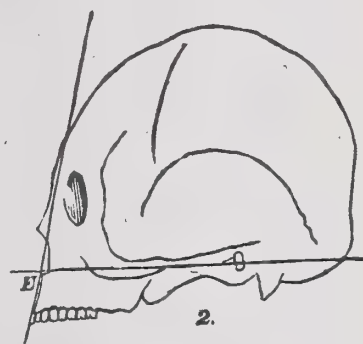
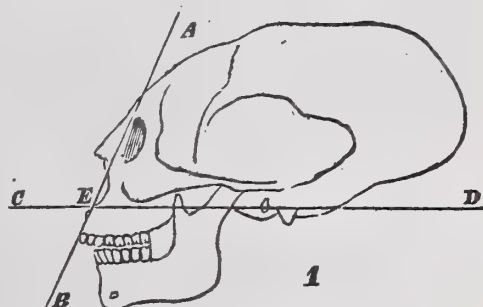
Illustrated by Seventy-eight Plates and a Colored Map.

BY
SAMUEL GEORGE MORTON, M. D.

PROFESSOR OF ANATOMY IN THE MEDICAL DEPARTMENT OF PENNSYLVANIA COLLEGE AT PHILADELPHIA; MEMBER OF
 THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA; OF THE AMERICAN PHILOSOPHICAL SOCIETY; OF THE
 HISTORICAL SOCIETY OF PENNSYLVANIA; OF THE BOSTON SOCIETY OF NATURAL HISTORY, &c., &c.

PHILADELPHIA:
 J. DOBSON, CHESTNUT STREET.
 LONDON:
 SIMPKIN, MARSHALL & CO.
 1839.

250 * The facial angle, which was first proposed by the learned Professor Camper, is measured in the following manner: a line called the facial line, is drawn from the anterior edge of the upper jaw, (or, if the tooth projects beyond the jaw, from the tooth itself,) to the most prominent part of the forehead, which is usually the space between the superciliary ridges. A second or horizontal line, is drawn through the external opening of the ear (meatus auditorius) till it touches the base of the nostrils, between the terminal roots of the front incisor teeth, and from this point it is still prolonged until it meets with the facial line already described: hence the two lines may meet at, or very near, the nasal spine, or base of the nose; but in other instances the decussation of the lines occurs at a point considerably anterior to the bone. It is obvious that an angle will be formed where these lines thus intersect each other, and this is the facial angle. For example, notice the annexed wood cut, (No. 1,) which represents the skull of the Cowalitsk already figured in this work, (see Plate 50.) The line A, B, is the facial line, extending, as just observed, from the anterior margin of the upper jaw to the most prominent part of the os frontis; the second or horizontal line, is represented between the points C and D, and for the purpose of having a fixed point for its anterior termination, I have uniformly carried it to the *nasal spine*, above and between the roots of the two front incisor teeth. The point E, where these lines decussate each other, is the facial angle, which in the present instance will be found to measure about sixty-six degrees.—The second wood cut (No. 2) represents the lines as drawn on a much better formed head, that of a Peruvian Indian, in which the angle at E measures seventy-six degrees.



The most casual inspection of these diagrams will satisfy any one that the facial angle is no criterion of mental intelligence; and in justice to Camper we must add that he does not assert it to be so. In fact it chiefly gives the projection of the face in relation to the head, without conveying the least idea of the capacity of the cranium, which is often the same in heads whose diameters are altogether different. The mere obliquity of the teeth contracts the angle; and what is yet more important, the space between the eyes from whence the facial line is drawn, may be very prominent, so as to give an angle of eighty degrees, while the forehead itself retreats so rapidly, that if the facial line were made to touch it, the resulting angle would not perhaps exceed sixty-five degrees.

"The maximum angle that can be embraced by the facial lines," says Camper, "is 100°: if we advance these lines still further, the head becomes preternaturally large, as in hydrocephalus. But it is surprising to observe that the most ancient Greek artists have chosen the very maximum of the facial angle, while the best Roman graveurs were satisfied with the angle of 95°.

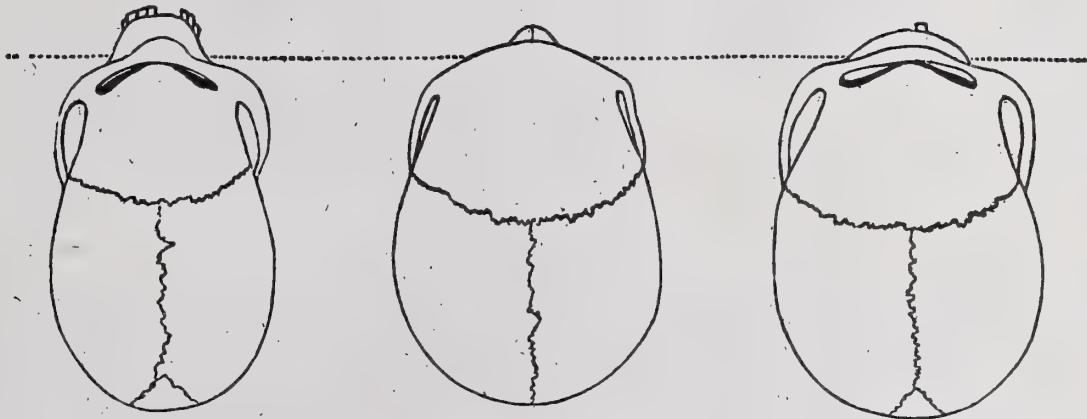
"I have thus established the two extremes of obliquity in the facial line, viz: from 70° to 100°"

These embrace all the gradations, from the head of the Negro to the sublime beauty of the ancient Greek models. If we descend below 70° we have an orang outang, or a monkey; if we descend still

lower we have a dog or a bird—a snipe, for example, of which the facial line is almost parallel with a horizontal plane.”—(*Dissertation sur les différences réelles, &c.*, p. 42, &c.)

Professor Blumenbach has denied that the genuine antique heads present an angle of 95° or 100° , and supposes that such measurements could only be derived from incorrect copies. Dr. Wiseman, on the other hand, remarks, “that whoever will examine the heads of Jupiter in the Vatican Museum, particularly the bust in the large circular hall, or the more defaced heads of the Elgin marbles, will be satisfied that Camper is accurate in this respect.”—(*Twelve Lectures, &c.*, p. 105.)

Another mode of comparing skulls was devised by Professor Blumenbach, called the *norma verticalis*, or vertical method; and consists in supporting the head on the lower jaw, and then looking down upon it from above and behind. If, however, several skulls are to be compared, they are to be stood each one on its occiput, the jaw being vertical and resting against a board or other plane surface. To make the comparison complete, the occipital ends should be so elevated as to bring the cheek bones on a line, as in the following diagram, which is copied from Blumenbach.—(*De Generis Humani Var. Nat.* p. 204, et tab. 1.)



The *first* of these figures represents a Negro head, elongated, and narrow in front, with expanded zygomatic arches, projecting cheek bones, and protruded upper jaw. The *second* is a Caucasian skull, in which those parts are nearly concealed in the more symmetrical outline of the whole head, and especially by the full development of the frontal region. The *third* figure is taken from a Mongol head, in which the orbits and cheek bones are exposed, as in the Negro, and the zygomæ arched and expanded; but the forehead is much broader, the face more retracted, and the whole cranium larger. Having been at much pains to give the *norma verticalis* of the skulls figured in this work, the reader will have ample opportunity to compare for himself. He will see that the American head approaches nearest to the Mongol, yet is not so long, is narrower in front, with a more prominent face and much more contracted zygomæ.

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Internal capacity.—An ingenious mode of taking this measurement was devised by Mr. Phillips, viz: a tin cylinder was provided about two inches and three-fourths in diameter, and two feet two inches high, standing on a foot, and banded with swelled hoops about two inches apart, and firmly soldered, to prevent accidental flattening.—A glass tube hermetically sealed at one end, was cut off

NEW ENGLISH CANAAN NEW CANAAN. Containing an Abstract of New England,

Composed in three Bookes.

The first Booke setting forth the originall of the Natives, their Manners and Customes, together with their tractable Nature and Love towards the English.

The second Booke setting forth the naturall Indowments of the Country, and what staple Commodities it yealdeth.

The third Booke setting forth, what people are planted there, their prosperitie, what remarkable accidents have happened since the first planting of it, together with their Tenents and practise of their Church.

Written by Thomas Morton of Cliffords Inn gent, upon some yeares knowledge and experiment of the Country.



Printed at AMSTERDAM,
By JACOB FREDERICK STAM.
In the Year 1637.

so as to hold exactly five cubic inches of water by weight, at 60° Fahrenheit. A float of light wood, well varnished, two and a quarter inches in diameter, with a slender rod of the same material fixed in its centre, was dropped into the tin cylinder; then five cubic inches of water, measured in the glass tube, were poured into the cylinder, and the point at which the rod on the float stood above the top of the cylinder, was marked with the edge of a file laid across its top; and the successive graduations on the float-rod, indicating five cubic inches each, were obtained by pouring five cubic inches from the glass tube *gradatim*, and marking each rise on the float-rod. The graduations thus ascertained, were transferred to a mahogany rod fitted with a flat foot, and these subdivided, with compasses for the cubic inches and parts. In order to measure the capacity of a cranium, the foramina were first stopped with cotton, and the cavity was then filled with *white pepper seed** poured into the foramen magnum until it reached the surface, and pressed down with the finger until the skull would receive no more. The contents were then transferred to the tin cylinder, which was well shaken in order to pack the seed.

NEW ENGLISH CANAAN,

O R

NEW CANAAN.

The Authors Prologue.

TH E art & industry should doe as much
As Nature hath for Canaan, not such
Another place, for benefit and rest,
In all the universe can be possesst,

The more we proove it by discovery,
The more delight each object to the eye
Procures, as if the elements had here
Bin reconcil'd, and pleas'd it should appeare,
Like a faire virgin, longing to be sped,
And meete her lover in a Nuptiall bed,
Deck'd in rich ornaments t' advaunce her
state.

And excellence, being most fortunate,
When most enjoy'd, so would our Canaan be
If well employ'd by art & industry (wombe
Whose offspring, now shewes that her fruitfull
Not being enjoy'd, is like a glorious tombe,
Admired things producing which there dye,
And ly fast bound in darck obscurity,
The worth of which in each particular,
Who list to know, this abstract will declare.

NEW

NEW ENGLISH CANAAN,
OR NEW CANAAN.*The first Booke.*

Containing the originall of the Na-
tives, their maners, & Customes,
with their tractable nature and
love towards the English.

C H A P. I.

*Prooving New England the principall part of all
America, and most commodious and fit for
habitation.*

HE wise Creator of the universall
Globe, hath placed a golden meane
betwixt two extreames: I meane the
temperate Zones, betwixt the hote
and cold; and every Creature, that
participates of Heavens blessings, with
in the Compasse of that golden meane, is made most
apt

B 2.

apt and fit, for man to use, who likewise by that wife-dome is ordained to be the Lord of all. This globe may be his glaife, to teach him how to use moderation, and discretion, both in his actions and intentions. The wife man sayes, give mee neither riches nor poverty; why? Riches might make him proud like Nebuchadnezzar, and poverty despaire, like Iobs wife; but a meane betwene both. So it is likewise in the use of Vegetatives, that which hath too much Heate or too much Colde, is said to be venenum, so in the use of sensitives, all those Animals, of what genus or species soever they be, if they participate of heate or cold, in the superlative, are said to be *inimica nature*, as in some Fishes about the Isle of Sall, and those Ilandes adjoininge, betwene the Tropickes, their participations of heate and cold, in the superlative is made most manifest, one of which, poysoned a whole Ships company that eate of it. And so it is in Vipers, Toades, and Snakes, that have heate or cold in the superlative degree.

Therefore the Creatures that participate of heate and cold in a meane, are best and hollofmost: And so it is in the choyse of love, the middell Zone betwene the two extreames is best, and it is therefore called *Zona temperata*, and is in the golden meane; and all those Landes lying under that Zone, most requisite and fit for habitation. In Cosmography, the two extreames are called, the one *Torrida Zona*, lying betwene the Tropickes, the other *Frigida Zona*, lying neare the Poles: all the landes lying under, either of these Zones, by reason, they doe participate too much

Use of vegetatives.

Fishes poysonous about the Isle of Sall.

Zona temperata, the Golden meane.

much of heate or cold, are very inconvenient, and are accompanied with many evils. And although I am not of opinion with Aristotle, that the landes under *Torrida Zous*, are altogether uninhabited, I myselfe having bene so neare the equinoctiall line, that I have had the Sunn for my Zenith, and seene proofe to the contrary, yet cannot I deny, but that it is accompanied with many inconveniences, as that Fish and Flesh both will taint in those partes, notwithstanding the use of Salt which cannot be wanting there, ordained by natures hande-worke. And that is a great hinderance to the settinge forth and supply of navigation, the very Sinewes of a flourishing Commonwealth. Then barrennesse, caused through want of raines, for in most of those partes of the world it is seldome accustomed to raine, untill the time of the Tornathees (as the Portugals phrase is, who lived there) and then it will raine about 40. dayes together, which moisture serveth to fructify the earth for all the yeare after, duringe which time is seene no raine at all: the heate and cold, and length of day and night, being much alike, with little difference. And these raines are caused by the turning of the windes, which else betwene the Tropickes, doe blow Trade, that is allwayes one way. For next the Tropicke of Cancer it is constantly North-East, and next the Tropicke of Capricorne it is Southwest, so that the windes comming from the Poles, do keepe the aire in those partes coole, and make it temperate and the partes habitable, were it not for thole and other inconveniences.

Raine 40. dayes together, which moisture serveth to fructify the earth for all the yeare after, duringe which time is seene no raine at all: the heate and cold, and length of day and night, being much alike, with little difference. And these raines are caused by the turning of the windes, which else betwene the Tropickes, doe blow Trade, that is allwayes one way. For next the Tropicke of Cancer it is constantly North-East, and next the Tropicke of Capricorne it is Southwest, so that the windes comming from the Poles, do keepe the aire in those partes coole, and make it temperate and the partes habitable, were it not for thole and other inconveniences.

This *Torrida Zona* is good for Grahoppers: and *Zona Temperata* for the Ant and Bee. But *Frigida Zona* good for neither, as by lamentable experience of Captaine Davis Fate, is manifest, who in his inquest of the North-west passage for the East India trade was frozen to death.

Capt. Davis
frozen to
death.

And therefore for *Frigida Zona*, I agree with Aristotle, that it is unfit for habitation: and I know by the Course of the celestiall globe, that in Groeneland many Degrees short of the Pole Articke, the place is too cold, by reason of the Sunns absence almost six monethes, and the land under the continuall power of the frost; which thinge many more Navigators have prooved with pittifull experience of their wintringe there, as appeareth by the history, I thinke, they will not venture to winter there againe for an India mine.

And as it is found by our Nation under the Pole Articke, so it is likewise to be found under the Antarticke Pole, yet what hazard will not an industrious minde, and courageous spirit undergoe, according to that of the Poët. *Impiger extremos currit Mercator ad Indas per mare pauperiem fugiens, per Saxa, per ignes.* And all to gett and hord up like the Ant and the Bee, and yet as Salomon saith, hee cannot tell whether a foole or a wise man shall enjoy it. Therefore let us leave these two extremes, with their inconveniences, and indeavour to finde out this golden meane, so free from any one of them. Behold the secret wisdom of allmighty God, and love unto, our Salomon to raise a man of a lardge hart, full of worthy abilities to be the Index or Loadstarre, that doth point out unto

unto the English Nation, with ease and comfort how to finde it out. And this the noble minded Gentleman, Sir Ferdinando Gorges Knight, zealous for the glory of God, the honor of his Majesty, and the benefit of the weale publicke, hath done a great worke for the good of his Country.

Sir Ferdinando Gorges
the originall
cause of planting
New
England.

And herein this, the wondrous wisedome and love of God, is shewne, by sending to the place his Minister, to sweepe away by heapes the Salvages, and also giving him length of dayes, to see the same perished after his enterprife was begunne, for the propagation of the Church of Christ.

The Salvages
died of the
Plague.

This judicious Gentleman, hath found this golden meane, to be situated about the middle of those two extreames, and for directions you may proove it thus: Counting the space betweene the Line and either of the Poles, in true proportion, you shall finde it to be 90. Degrees: then mult we finde the meane, to be neare unto the Center of 90. and that is about 45. Degrees, and then incline unto the Sotherne side of that Center, properly for the benefit of heate, remembering that *Sol & Homo generat hominem*; and then keepe us on that same side, and see what Land is to be found there, and we shall easily discerne that new England is on the South side of that Center.

For that Country doth beginne her boundes at 40. Degrees of Northerne latitude, and endes at 45. New English. Degrees of the same latitude, and doth participate of *is placed in* heate and cold indifferently, but is oppressed with the golden meane. neither: and therefore may be truly sayd to be within the compasse of that golden meane, most apt and fit for.

GEOGRAPHICAL DISCOVERIES.

Lieutenant Maury's Address before the Geographical and Statistical Society.

Last evening Lieutenant MAURY delivered the Annual Address in the Chapel of the University before the Geographical and Statistical Society. There was a large assembly, notwithstanding the unfavorable state of the weather. Previous to the delivery of the lecture, Hon. GEORGE BANCROFT came forward and said that it gave him great pleasure to meet on large and respectable an audience on the second anniversary of the existence of their Society. He was glad that it was beginning to attract general attention. Nothing less was to be expected; and considering the approbation and favor they had met with, he was sorry they had not been able to do more. It was their intention to collect and concentrate the progress that the world was making in Geographical Science. He had great satisfaction, also, in stating that the charter of their incorporation had passed the Senate of the State, and would probably meet with an obstacle in the other branch of the Legislature. When they were organized they could rely with great confidence on the assistance which always distinguished the citizens of the city. He would now introduce Lieutenant MAURY, reputation address them. He was a gentleman whose name to Geographically extended for his useful contributions to such occasions.

Lieut MAURY, after a few introductory allusions to the importance of such occasions, introduced the subject of the geographical problem which for ages has baffled the world, has been solved during the past year. Though no ship has, as yet, actually made the Northwest Passage, yet navigators coming from the West, and navigators coming

from the East, have met together and shaken hands across the ice. Lieut. CAMERON, of Her Majesty's Navy, entering the Arctic ocean through Behring's Straits, in the *Investigator*, has sailed and traveled and sailed until to him belongs the distinction of having been the first to put a girdle round about this great Continent of the North.

Commander McCLELLAN, in her Majesty's ship *Assault*, doubled Cape Horn in the Spring of 1850, on a voyage to the Arctic regions in search of Sir JOHN FRANKLIN and his companions. Entering Behring's Straits, he parted company with H. M. S. *Herold*. Capt. KELLATT, off Cape Lisburne, July 31, 1850, and was lost seven six days afterwards, on that side, standing to the northward and eastward, with standing sails set. These KELLATT left him, to return to England. The next time he was seen was on the 6th of April, 1853, in the Bay of Mercy, by Lieut. FIM, who was serving under KELLATT. Thus KELLATT and his officers were the last to bid McCLELLAN "God speed" on the west, and to give him the helping hand of welcome on the east.

To McCLELLAN belongs the high honor of putting to rest this vexed question of a Northwest Passage. On the 28th day of October, 1850, being on a traveling party with a ship, he established the fact that the strait between Barclay Island and Prince Albert Land, which he called Prince of Wales Strait, and in which his ship was, connected itself by water and ice with Baffin's Bay, through Melville Sound, Barrow Strait and Lancaster Sound.

This is the question that has vexed Old England for centuries. The problem of a short cut to Cathay — of a passage to the East, is the most important geographical problem that has ever engaged the attention of the world. It was this problem that led to the discovery of the New World. And after this continent was discovered and portended out to kings, a passage westward to the Indies was still the grand problem.

At this very moment the subject of a railway to the Pacific, of canals across the Isthmus, and their bearings upon that self-same land of Cathay, fill a large space in the public mind. So that we have not yet done with this interesting problem, though, nearly four centuries have elapsed since it first was taken up.

If a *bone side Northwest Passage*, one that could be available at all times and that would afford a passage to *medicines*, could really have been found, it would have placed England almost as near to China as she now is to the Islands of Panama.

Accordingly we find her, whenever, during the last 300 years, she has had a respite from war, pushing forward her expeditions for the discovery of this passage. Indeed, since the last European war, and during the long peace which has followed it, her efforts at a Northwest Passage have been up to this hour almost incessant.

All this therefore to Capt. McCLEUNE for having settled this question.

It is true the whales of the sea had, in their mute way, suggested that there was a water communication from one side to the other, for we find the same kind of whale in Baffin's Bay that is found in Behring's Straits, and know that the torrid zone is to this animal as a sea of fire, through which he cannot pass.

The right whale of Behring's Straits, it was proved, never could double either Cape Horn or the Cape of Good Hope. In fact, he could not pass over into the Southern Hemisphere at all. Therefore when the same whale that was found in Behring's Straits was seen also in Baffin's Bay, the conclusion was almost irresistible that there was a Northwest Passage, and the whales knew of it.

The currents of the sea also had indicated that there was communication from one side to the other. And philosophers consulting the agents which control the winds, and studying the development of nature, had gathered data from these regions leading to prove the same thing.

It is true the question of an open sea in the Polar basin has been left in the category of an unsolved problem. McCLEUNE's track was for the most part along the coast, and therefore he could not throw much light upon this question.

So, as for the Northwest Passage, money, time, and the lives of many gallant sailors had been offered up in the effort to find this communication. The problem was too important, the national mind of a self-relying and a proud people was too deeply interested, to admit after such sacrifices any other evidence as conclusive, short of that which appeals to the senses and comes within the category of proof positive.

All honor, therefore, to Commander McCLEUNE and his gallant crew, who have withstood the icebergs and narrows, from privation and danger, this proof. I hope, and I am sure this Society will hear with joy in the winter, at our next annual address, your orator will have the pleasure of calling him "Admiral," for I consider he has performed a most important work. The geographical fact that he has established, viz: that there is no practicable way through the Northwest to the "Indies," is, next to the discovery of a practicable way, the most important discovery that it was possible to make in these regions.

Call it a negative discovery, if you please: negative results are to him who is in search of truth, sometimes, in the importance of their bearings, equal to, and alto-gether as reliable as positive.

Get home? Does any one ask the question?

Why the energies of Great Britain--if the most powerful nation that has ever yet culminated in its greatness--have been directed to a passage there? And they have been directed with an intensity and with an earnestness that have diverted the mind of a great people from other and perhaps more beneficial enterprises.

The money which that nation has expended from first to last in the search of that passage would, with its interest, nearly suffice now to connect the two oceans by a canal across the Isthmus. Her own officers have, at last, demonstrated that there is no practicable route to the Northwest. The attention, therefore, of that great nation and people will now, no doubt, be as earnestly directed to some practicable route, either by railway or canal, across the continent.

I content myself with this brief allusion to the subject, hoping it will at least attract the attention of the British Geographical Society, which, like the great English nation, I know to be composed of men who love right and hate wrong.

I turn now to more pleasing subjects, and congratulate the Society upon the activity that has been, and is now, displayed by our own Government and fellow-citizens in the various fields of Geographical research.

Kang, of the Navy, is now on a second expedition to the Arctic regions, in search of Sir JOHN FRANKLIN and geographical lore. That expedition was, I may say, started here in this Society, and therefore I need only re-

informed you that our latest intelligence from it was 20th July, 1859, when it had safely arrived at Upernivik.

In 1850, Lieut Wm. L. Hazardon, United States Navy, was sent to explore the Valley of the Amazon. He was directed to cross over the Andes from Lima, and reaching the head waters of that river he was to follow it to the sea.

The object of this expedition was eminently practical and highly important. It was to ascertain the present resources and future capabilities for trade and commerce of that magnificent water-bed. This report has been published by order of Congress, and it will be found one of the most interesting, instructive and valuable documents of the day. He ran a line of soundings from the sources of the Amazon among her mountains to its mouth under the ice, and found it navigable for vessels of the largest class, from the sea to the base of the Andes, a distance of nearly 3,500 miles. The expedition brought home, besides the notes of the leader, a valuable collection consisting of specimens of the flora and the fauna, and other matter illustrative of the physical geography of that most interesting region of country. These have not been described for the want of funds—\$2,500 survey the Government will furnish this sum, for it is certainly worth the expense.

The capacities of the country drained by the Amazon to sustain a population are thought to be the greatest in the world, and with a population equaling that of Belgium in the square miles, that river basin includes an area that is large enough to sustain a greater number of people than is now living upon the surface of the earth.

The winds and currents of the sea are such as to place the Atlantic ports of the United States on the way to all the nations either east or west from the mouth of the Amazon. Therefore there is a region of country beyond our own borders, the physical geography of which is as interesting to the people of the United States, commercially or rather practically, the basis of commerce, may be regarded as one of the elements of physical geography; for explanation to the physical geography of a country, and I will tell you on what productions it is capable. In this sense, therefore, that relates to the physical geography of the Atlantic slopes of South America, is calculated to be particularly interesting to the American citizen, because it is the source of such powerful bearings upon the

extension of his country.

Admiral. I am, to the U. S. steamer Water Witch, with a crew of 100 men, the most excellent officers, is engaged in an exploration of the Rio de la Plata, and its tributaries. This year is the object of the Southern American Expedition. The Pacific will be supplied with instruments and maps. He has with him a hydrographic construction, with all the appliances which humanity has brought to modern geography. He said his object is to know what to do with them. They have work, and rejoice in it as much as we.

I repeat, the fact is, with all survey is done, and we shall know as much about the basin of that river, its commercial resources, active and dormant, its present capabilities and future capacities, its climate, its topography in its widest sense, of that great hydrographic basin, will be then quite as well understood as the coast of the United States.

By an letter from him is dated Oct. 31, 1859. He was then with his expedition at the city of Asuncion, on the Parana River. The head of the expedition, the Commodore, was a very intelligent man, and he carried many feet of traces up to the city,

which is further from the mouth of the Rio de la Plata than St. Louis is from the mouth of the Mississippi.

Lieut. GUTHRIE, U. S. N., is preparing for publication his labors as the Director of the Astronomical Expedition to Chile. He is an officer of the most untiring industry. He was once, from him valuable contributions to our knowledge touching the geography and statistics of that interesting and thriving country.

LEWIS, MCHES, one of his associates, who returned in the United States by crossing the passes of the Andes, has gone back to make further investigations. He, too, will, in due time, be ready with his notes to cast it into the common geographical treasury of the world.

That other great geographical problem which has engaged the attention of the world as long as the New World has been a day-dream with the men of England, has no escaped the attention of the Government in these stirring geographical times. The project of a ship canal across the Isthmus of Darien has been renewed, and it is a matter to be presented to the world under more favorable auspices than it has ever yet been.

Lieut. STRAIN, U. S. Navy, sailed last December, with

an excellent corps of young officers, in the United States ship *Cyclops*, for the purpose of examining that route thoroughly. There is, therefore, in store among the laborers of that party, another valuable contribution to the general stock of human knowledge.

Anchoring in Calicut Bay on this side, he will, from that beautiful sheet of water, enter the valley of the Calicut river, which discharges there and tracing this water shed to the "divide" between the two oceans, he will cross over and descend through the valley of the Savanna River to the Bay of San Miguel, another fine harbor, through which the waters of this river reach the great South Sea.

America has done but little for the geography, in one sense, of the "Grand Ocean," as some of the early navigators called the Pacific, since Lieut. Wilkes was there, 18 years ago. Recent installments to the geographical treasury of the world are already on their way home from these regions, and a new expedition is on its way out for more. Commodore Penny, with his accustomed energy, has already had surveys made of several important places in the East—among them the harbor of Jeddo, which is described by his officers as one of the boldest and most beautiful sheets of water in the world—not excepting the harbor of San Francisco, or of Naples, or of Rio, nor your own lovely bay.

"We succeeded," says Lieut. Bent, of the *Menestier*, in a private letter, "to within about seven miles (in a straight line) of Jeddo, carrying from 40 to 17 atoms wa'er all the way. This was nineteen miles nearer the capital than any foreign vessel had ever previously been. This occurred after the reception, and as everything had gone on very successfully, the Commodore did a twelfth we had obtained that would militate against the advantages of the city, which would have given, I imagine, in point of land some three miles ahead."

"This is the fairest sheet of water in the world, not excepting Rio and San Francisco. Thirty five by twenty-five miles in diameter, surrounded by numerous snug coves and most lovely shores, it contains not a single island except close along its borders, and so is perfectly clear from obstructions of any kind to navigation. It is six miles in width, by a strait, some sixteen miles to sixteen miles in width and forty fathoms in depth."

He is constructing a chart of that harbor.

Rising out with his squadron has just about this time entered fairly upon the field of his operations, which includes the North Pacific Ocean, with its arms, straits, and gulfs. That is the largest surveying expedition now afloat under any flag. And never has any nation sent forth an expedition in the cause of science better fitted and more than that is for accurate work and practical results, it has with it all the means and appliances that Government, in the indulgence of an enlightened liberality, could suggest, or that science, ingenuity, and the improvements of the age could bestow. If a squadron consists of five vessels. He is assisted by a corps of young and accomplished officers, who have entered upon this service with more. These constitute the elements of success. We may expect, therefore, in the course of the next three years much valuable information concerning the North Pacific Ocean for discovery and results as far as made, and obtained are to be sent home to the Hydrographical Bureau of the Navy for publication.

Thus we have, or will have, to enrich our archives, De Ravan and Kane in the Frozen Sea; Straits and Hassard, with GIBSON, his companion, in the Torrid Zone; Penny and Ringgold in the East; with PAOS and Gilliss and McKee in the West.

Nor should I forget the line of deep sea soundings especially, which was run last Summer by Lieut. BERRY, commanding the U. S. brig *Albatross*, from the neighborhood of Newfoundland to that of Ireland. That line has important and practical bearings upon the question of a submarine telegraph between Europe and America.

But while the Navy has been thus busied abroad, the army and other branches of the public service have not been idle at home. The Coast Survey is a long-established institution. A report of its proceedings is annually made to Congress. Gentlemen are familiar with the value of its labors, and therefore it is only necessary in this connection to refer to it as an establishment that has done and is doing much for those departments of knowledge which it is the special object of this Society to cultivate.

In the same category comes the hydrographic survey, by the army, of the great American Lakes. That work too, is being pushed forward even with more than its wonted vigor. It is already enriched the department of

geography with an important discovery. You know it has been said that the bottom of Lake Huron especially, was far below the level of the earth. Macomb informs me that somewhere in that lake has been able to find water more than 480 feet deep, which places the bottom of that lake far above the surface of the sea.

The Mexican Boundary Commissioner is busily engaged in bringing up its results.

Seeing these, there are various parties at work exploring routes across the wilderness for the great Pacific railway. Lieut. Williamson is on the Pacific slope, turning his lines with the surf-level at the head of the Governor's River as at the North. Lieut. WHEELER is at the South and GUNNISON—a naval personage—was in the middle. Science has its achievements, and peace its triumphs, yet how much does it not sometimes cost to win them! Lieut. BELLOT, of the French Navy, upon the ice of the Polar basin; Lieut. GUNNISON, of the American Army, upon the great divide which separates the waters of the Atlantic from the waters of the Pacific, have each fallen victims in the cause of that science whose achievements we celebrate. Though far apart, they were fellow laborers in the same cause. They both were in search of a common road to Cathay. There were gallant spirits, two men more richly endowed with the accomplishments of officers and the qualities of gentlemen, never tell before the ruthless hand of the savage or the remorseless billows of the sea.

The English have resolved to erect at Greenwhich a Monument to BELLOT. Shall we be less mindful of our own than they are of strangers? No. Let us resolve, when this Railroad is finished, to erect in the middle of it, and on some towering mountain peak, a monument to that gallant young sailor. Place it on the summit of the highest hill-top, where it may catch the first rays of the morning sun as he rises from the Atlantic and where his parting beams, as he sinks to rest in the Pacific, may linger to greet.

Not should I omit to mention, among the valuable labors of the officers of the Army, the very successful and interesting exploration of the Zima River by Capt. SIBBERRYS, United States Army, and his party. Much of the credit of that officer went over is new.

Besides these, FARMOST and BEALE have also been striving with the Indians and a regging with the snows

of that great divide, the latter with that daring and gallantry which has challenged our admiration on former occasions—the former with a courage of energy and zeal that has seldom been equalled, never surpassed. We owe to him much of our geographical information concerning that region of the country, and he has made contributions which have been acknowledged and appreciated wherever geography is cultivated as a science. An enthusiastic amateur, that brain explorer is now there at his own risk and expense, for the purpose of solving certain questions which in his former expeditions he was unable to decide.

From this hasty review of what has been recently done, and of what is doing, for geography by the Government and the people of the United States, it appears that few countries have ever at any time been able to boast of more activity in this department of scientific research and discovery. And which of these expeditions has not the public mind followed with interest, and pleasure and profit? To the honor of our free institutions and of a free people be it said, not one. The popular will is in favor of them all. But though much has been done, these researches and these expeditions are, as they have made their advances, served to extend the horizon, they give us new lights and show us that much yet remains to be done. Prominence among the legends of this Society during the coming year, is to foster, by its influence and its counsels, another expedition up the Amazon, like PADOA's in the La Plata. The Amazon is at our command, and we begin with it.

I shall only allude to one other, which cannot fail to commend itself to the good offices and favorable consideration of this Society, and that is, the exploration of the Valley of the Amazon in Metchoum. This river, I believe, belongs to Russia, though its navigation was ceded to China by PETER the Great, in 1689. That was before modern science and enterprise could have been brought to bear upon it; consequently, unless a party be sent to explore it from some of the States in Christendom, it will continue to rest in its present darkness for other centuries.

The navigation of the Amazon was given, it is understood, for the privilege of holding a fair at Kishin, or establishing a factory at Petia, which, according to Sir GEORGE SIMPSON, has turned out a poor compensation.

very well-appointed ship, on one side, across the ocean, into a floating observatory, and to unite the whole sea-faring world into one general system of physical research; and thus an attempt, a well directed attempt, has been made to bring the sea regularly within the domain of philosophical research.

But the atmosphere embraces the land as well as the sea. It is a whole, and as such, is agitated, its phenomena and its laws ought to be studied. And why should not the same concert of action and an intimacy of observation which Holland and Denmark and Spain and Prussia, Sweden, Russia, Norway, Belgium, Prussia, England and the United States have agreed at the recent inauguration of the Brussels Conference, to extend to the sea,—why should not the same uniformity and concert be extended also to the land?

It is now proposed to convene in Brussels a general Meteorological Congress, which shall consist of the more celebrated men from every Christian nation, and that it shall be the duty of this assemblage to devise a plan of meteorological research, which including both sea and land, may become universal.

QUESTEL, and KIEHL, HANSEN, KOPPEL, BUVÉ, BALLU, ALEX. SECHET, LAMONT, SAWIN, JAMES and JANSON, and BRACHET with a host of others, have expressed themselves in favor of it. But for it to commit itself to the favorable consideration of this Society, and to its active support, it is only necessary to say, that the propriety is one which promises many highly important and useful results. Nor does it call either upon Government or individuals for any heavy expenditure. As a consequence of the discretion, to which the investigation made by the Navy touching the phenomena of the sea have given rise, a new department of science has been added to the stores of human knowledge. Perhaps the expression is too strong; therefore I will say the cornerstone for a new department of science has been laid, and I quote HUMSOLDT for authority. According to that great and wise man, a new branch of science has recently sprung up on this side of the water. It is styled Physical Geography of the sea, and to the American Navy he ascribes the honor of originating it.

As some of the first fruits of it, Lieut. MAURY exhibited several plates illustrating the shape of the basin which

for the uses of this valuable artery to Central Asia, and by which across the Russian Possessions of Kamtschatka and the islands beyond, are secured to half their value.

The vessel, however, concerning the winds and currents of the sea, which have been carried on at the Observatory, enables me to say that the climate of that river basin corresponds to that of our like basin including the valley drained by the St. Lawrence, the Hudson, and the rivers of the New England States generally. And what the commerce between these States and river basins with Europe is, such may be—and in time will be—the commerce between the Amour and the Pacific States of this Union.

China is in a state of revolution, and one of the first things after the revolutionists get firmly seated in power, will be, no doubt, an attempt on the part of the United States to form a commercial treaty with that people upon more liberal principles. And that this treaty should be made with eyes open, how important is it that our diplomats should have full and complete information as to that immense Amour country—as to the navigation and navigability of that river, and as to the present capabilities and future capacities for trade and commerce. It is to be hoped that the enlightened Statesman at the head of the Navy Department, will ere long feel himself ready to sail on just such an expedition.

There has been not a few during the last year another move by the Government of the United States which, in the judgment of many, is calculated to have important and wholesome bearings upon the physical geography of the world. I allude to the Maritime Conference at Brussels, which was held by invitation of this Government, and in which were represented in the persons of twelve delegates the principal Maritime Powers.

There is a close relation between the fauna and the flora of every country. The animal kingdom is based upon the vegetable, and the flora, if you please, may be considered as the resultant of meteorological agencies, of heat and cold, of clouds and sunshine, of rain, dew, and the hygienic relations generally of the atmosphere.

Now, whatever is calculated to throw light upon these creations, has a bearing upon your favorite science, for the fauna and the flora of a country constitute its physical features in its physical geography. The letters of the twelve men, as they sat in conference around the table at Brussels, had for their object to origi-

holds the waters of the sea, and a vertical section from one side of the Atlantic to the other from the deep sea soundings made by officers of the Navy, by a process which was described somewhat in detail, and said to be the invention of Passed Midshipman J. M. BROOKS. Specimens of the sea bottom thus obtained, were sent to Professor BAILEY, of West Point, for microscopic examination, and a letter from that gentleman indicated his estimate of the importance of the study.

Lieut. MAURY's address was heard with marked attention, and at its close a vote of thanks proposed by Mr. RANNOFT, and seconded by Dr. HAIRD and others, was unanimously adopted.

in this state they are eaten by the aborigines as we do Chestnuts.

Stately avenues are formed of the Live Oak in South Carolina and Georgia, which, robed in Long Moss, put on an air of sombre grandeur and wildness.

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The Oaks, though a very extensive genus, are confined to the Northern hemisphere. Besides the numerous species which pervade the United States, 16 were discovered by Née in Mexico and New Spain, one of which, the *Q. agrifolia* is found in Upper California; 21 species were added to the Flora of North America by Humboldt and Bonpland found also in New Spain; 4 species were discovered in Japan by Thunberg; 2 in China by Bunge; 1 in Cochinchina, and 1 in the island

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LIVE OAK, (*Quercus virgens*.) Trees near Magnolia, in West Florida, occur of 8 to 9 feet diameter; it consequently affords large timber. Great quantities of this wood are now brought from the coast of West Florida. According to Wm. Bartram, the Live Oaks on the St. John's in East Florida, are from 12 to 18 feet in circumference; the trunk there rises only from 12 to 20 feet, when it throws out 3 to 5 large limbs, which continue to grow in nearly a horizontal direction, each limb forming a gentle curve from its base to its extremity, (Bartram's *Travels*, p. 85;) and he adds, I have stepped above 50 paces, on a line, from the trunk of one of these trees to the extremity of the branches. The wood is almost incorruptible, even in the open air. The acorn is small, agreeable to the taste when roasted, and

THE
NORTH AMERICAN
SYLVA;
OR,
A DESCRIPTION OF THE FOREST TREES
OF THE
UNITED STATES, CANADA, AND NOVA SCOTIA,
NOT DESCRIBED IN THE WORK
OF
F. ANDREW MICHAUX,
AND CONTAINING ALL THE
FOREST TREES DISCOVERED IN THE ROCKY MOUNTAINS, THE TERRITORY
OF OREGON, DOWN TO THE SHORES OF THE PACIFIC AND INTO
THE CONFINES OF CALIFORNIA, AS WELL AS IN
VARIOUS PARTS OF THE UNITED STATES.
ILLUSTRATED BY 122 FINE PLATES.
BY THOMAS NUTTALL, F. L. S.,
Member of the American Philosophical Society, and of the Academy of Natural Sciences
of Philadelphia, &c. &c. &c.
IN THREE VOLUMES.
Vol. I.
BEING THE FOURTH VOLUME OF MICHAUX AND NUTTALL'S NORTH AMERICAN SYLVA.

PHILADELPHIA:

J. DOBSON, 106 CHESTNUT STREET.

ALSO FOR SALE BY R. BALDWIN, PATERNOSTER-ROW, LONDON; H. BOSSANGE, No. 11 QUAI VOLTAIRE, PARIS; PERTHES, BESSER & MAUKE, No. 22 JUNGFERNSTIEG, HAMBURG.

1842.

of Formosa; 2 very remarkable species with lanceolate entire leaves and very long spikes of flowers, like those of a Chestnut, were met with in Nepaul by Wallich; 6 other species likewise exist in that portion of India; Europe, chiefly the southern part, Northern Africa and Armenia afford about 28 species and several varieties; Java, Sumatra and the Molucca Islands also produce 19 species. Thus it appears, of the whole number, (according to the enumeration of Willdenow and more recent discoveries,) the Old World contains 63 species, and North America, including New Spain, about 74. Of these the United States possess about 37, and New Spain the same number. To these I may also add an additional species from the island of Cuba, nearly allied to our Southern Grey Oak, (*Q. cinerea*;) this I propose to call after its discoverer, M. La Sagra,

ALNUS INCANA; foliis oblongis acutis subtus pubescentibus, axillis venarum nudis, stipulis lanceolatis. WILLD. Sp. pl. *Alnus undulata*, WILLD. Sp. pl., vol. 4. p. 336. Black Alder, (*Alnus glauca*,) Mich. Sylva, vol. 1. p. 376. *Betula Alnus, crispa*, Mich. Flor. Bor. Am., vol. 2. p. 181. *Betula crispa*, AITON. Kew., vol. 3. p. 339. *Betula alnus*, & LINN. Sp. pl.

[This species forms a much smaller tree than the common Alder, being only 12 to 18 feet high, and sometimes indeed a mere shrub, as in the Alleghany Mountains in Pennsylvania. In Massachusetts and Maine it attains its greatest size. Its bark is grey or cinereous; the leaves are sometimes villous beneath, and the stipules persistent after the development of the leaves, which are no way glutinous; those of the young plants are smooth and glaucous beneath. It is common to the mountainous parts of Europe nor less than to the northern parts of the United States. It occurs likewise in this vicinity.]

THE NORTH AMERICAN SYLVA;

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OF OREGON, DOWN TO THE SHORES OF THE PACIFIC, AND INTO
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VARIOUS PARTS OF THE UNITED STATES.

ILLUSTRATED BY 12 FINE PLATES
BY THOMAS NUTTALL, F. L. S.,
Member of the American Philosophical Society, and of the Academy of Natural
Sciences of Philadelphia, &c. &c. &c.

IN THREE VOLUMES.—VOL. II.
BEING THE FIFTH VOLUME OF MICHAUX AND NUTTALL'S NORTH AMERICAN SYLVA.

ROBERT P. SMITH, PUBLISHER,
NO. 15 MINOR STREET,
PHILADELPHIA.
1852.

[The original issue of
volume two seems to
have appeared in 1849.
It rather might have used
reprint.]

[Extracts from Volume Two
appear on the following
page.]

P. HEMALIS. Elliott, Sk., vol. 1. p. 542.
 CERASUS NIGRA, (*Loisel.*) SERINGE in DECAND. Prodr., vol. 2. p. 538. Hook. Flor. Bor. Amer., vol. 1. p. 167.

Few plants in North America have a more extensive range than this species of Plum: it is met with from the Saskatchewan towards Hudson's Bay, and through all the intermediate country to Georgia, Louisiana, and Texas. In the western part of the State of New York it is very common, and, in some instances, (as it appeared to me in 1810,) it has been cultivated by the aborigines around their dwellings in the same manner as the Chickasaw Plum. When truly wild, it seems to

affect the banks of streams and rich bottom lands. In New Jersey, near Franklin furnace, (Sussex county,) I have observed trees 20 to 30 feet high, and with trunks from 6 to 14 inches in diameter. The ordinary height, however, is from 15 to 20 feet. The wood is hard and of a reddish colour, like that of the Wild Cherry, (*Prunus serotina*.) The fruit, when mature, which is in the month of August, is from $\frac{1}{4}$ an inch to an inch in diameter, in some instances almost wholly yellow, but commonly vermilion red on one side, wholly red, or a mixture of both colours, and in all the varieties covered more or less with a very evident bloom. When ripe it contains a very sweet thin pulp, with the disadvantage however of having a thick bitterish acerb skin, but by cultivation it is considerably improved, and the fruit is sometimes, as Dr. Darlington remarks, as large as a common Apricot. In Upper Canada, where it was formerly cultivated, I have seen as many as twelve distinct varieties in the same orchard. It is also free from the attacks of the insects which have proved so fatal to nearly all the cultivated Plums.

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PYRUS AMERICANA, foliis pinnatis glabris, foliolis oblongo-lanceolatis acuminatis inciso-serratis, serraturis setaceo-mucronatis, cymis compositis multifloris, fructibus globosis.

The Mountain Ash, or Roan Tree of North America, is met with sparingly in shady moist woods in mountainous situations, from Labrador and even Greenland, throughout the New England States, New York, Pennsylvania, and the variety *microcarpa*, with smaller berries, extends to the high mountains of Virginia and North Carolina.

It forms a small tree of great beauty, remarkable for its elegant feathered foliage, in May and June clad with its white and fragrant blossoms, and to the close of the year, even into winter, decorated with its large clusters of bright berries, which afford a favourite repast for thrushes and other frugivorous birds

JOURNEY THROUGH TEXAS;

OR, A

SADDLE-TRIP ON THE SOUTHWESTERN FRONTIER:

WITH A

STATISTICAL APPENDIX

BY

FREDERICK LAW OLMSTED,

AUTHOR OF "A JOURNEY IN THE SEABOARD SLAVE STATES,"
 "WALKS AND TALKS OF AN AMERICAN FARMER IN ENGLAND," ETC., ETC.

NEW YORK:

DIX, EDWARDS & CO., 321 BROADWAY.

LONDON: SAMPSON LOW, SON & CO.

EDINBURG: THOS. CONSTABLE & CO.

1857.

[For extracts from
 Olmsted see the
 pages that follow.]

On the other occasion, the boys were alone with their mother, Mr. D. having gone on a two or three days' excursion. They were awakened in the night by a stir about the out-houses. There

had been signs of a panther about the hog-yard for several days, and they sprang out as they were, seizing their guns, in the hope of putting an end to the marauds. The night was pitchy dark, and stealing cautiously along, they came suddenly upon an enormous panther, within a few yards of the door. The panther gave one bound into a tree, probably more startled than themselves. He was quite invisible, and perfectly still. One of the

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boys thought of a lantern, and, running back, found his mother already up and alarmed. "A lantern," he shouted, in a furious whisper, and ran back to the tree. The mother appeared with the lantern at the door, and came, in her night-dress, to the tree. What would she have thought at court, five years before, of holding a lantern, to shoot a panther? She held it high. Both boys took slow aim at the glaring eye-balls, which alone were visible above them. One pulled; the gun snapped. A quick jerk of the eye-balls gave warning of a spring, when a ball from the other rifle brought the panther dead to their feet. It proved, by daylight, the largest that had been known in the settlement, measuring nine feet from nose to tip of tail, and weighing, by estimate, 250 lbs.

After supper, there were numerous accessions of neighbors, and we passed a merry and most interesting evening. There was waltzing, to the tones of a fine piano, and music of the highest sort, classic and patriotic. The principal concerted pieces of Don Giovanni were given, and all parts well sustained. After the ladies had retired, the men had over the whole stock of student-songs, until all were young again. No city of fatherland, we thought, could show a better or more cheerful evening company. One of the party said to me: "I think, if one or two of the German tyrants I could mention, could look in upon us now, they would display some chagrin at our enjoyment, for there is hardly a gentleman in this company whom they have not condemned to death, or to imprisonment for life."

In exile, but free, these men make the most of life.

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There is something peculiarly exciting in combatting with a fierce fire. It calls out the energies and the strength of a man like actual war. We had been hotly engaged for more than three hours, and it may be imagined we returned to our tent, after patrolling together our whole outer lines, greatly exulting and fatigued. Our wounds were mainly for the good of the trade of shoemakers and tailors, and the singeing our heads received somewhat postponed our poll-tax payment to the hair-cutters.

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life that such fires must occasion, and recalled, in the leisure of imagination, some of the scenic effects of the flame and smoke hurrying up the face of the hill, that had passed with but momentary perception while we were in the heat of our exertions.

"The fear of the damage it might do the settlers," said the Doctor, "did not make me feel the culpability of starting the fire, nearly as much as seeing the ants crowding away from it on to the stones in the edge of the water, when we had carried it down to the creek, and afterwards, when I noticed the tumultuous excitement of a wren, that probably had a nest in the bushes."

The grandest and most remarkable picture that had painted itself on my memory, had presented itself at the time when I came up the hill in the rear of the fire.

The landscape was still brightly illuminated by the central fire on the hillside, and we amused ourselves with each other's appearance, our faces, red with heat, being painted in a very bizarre fashion, like Indian warriors', with streaks and spots, and clouds of soot and coal.

Having got up our tent and washed, and changed our drenched clothing, and made a pot of coffee, and watered our horses, and given them corn, we brought out our blankets and lay down in the edge of the standing grass, and waited still an hour, that we might be sure all was safe for the night, before we went to sleep. And as the flames grew less, and the smoke-cloud slowly vanished, and the big, red moon came up swelling like a balloon on the other side of the dale, and the ants came crawling up our legs, and the first musquito of the season came singing in our ears, we reflected on the immense destruction of insect

March 1st.—We crossed the Guadalupe upon a ferry-boat, the bridge having been long ago carried away in a freshet. The ferryman informed us that a steamboat of light draught used to ply upon the river, reaching Victoria. In summer there was sometimes not more than eighteen inches water in the channel. Since our visit I understand that both the lower Guadalupe, as far as Victoria, and the San Antonio, as far as Goliad, have been made navigable, by individual enterprise. The bottom, at the crossing, is heavily timbered. Very few leaves were yet to be seen. From the bottom, the ascent is rapid, and our day's ride towards Goliad lay through high prairie, with belts of post-oak. The soil is sandy, and appeared poorer than on the east side the river, but the cattle were in much better order.

Two men overtook us, and made offers of horse-trading. On learning we were from New York, one of them said, "From New

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York! You're a long way from your *native* home, aint you? I expect you seem to think the country here tolerable curious. Folks from up north always think the people here's awful rough. We aint so smart down south as you be up to the north. We don't fix up so much, I reckon, do we? Reckon you see some people that's right curiosities, don't you? Well, folks down south likes to live rough. It takes all sorts to make a world."

We passed a man engaged in firing the prairie. He drew a handful of long, burning grass along the dry grass tops, at a run. Before the high gale it kindled furiously, and in fifteen minutes had progressed a mile to leeward, jumping, with a flash, many feet at a time. In a moderate wind we had once noted the progress of prairie flame, to windward, at about one foot per minute.

Camped on Manahuila creek. The following morning we were writing in the tent, waiting the termination of a gentle shower which was falling, having had before a delicious bath, of agreeable temperature, in the creek, when we heard an indistinct roar advancing toward us. As usual, we did not recognize the sound for an instant, and thought a freshet was, perhaps, coming down the creek. At the door we saw and recognized the black cloud approaching, and jumped to the tent pins, which had been partly drawn before the shower. We were barely in time; the blast struck us before we could fasten down the doors. The tent bellied and swelled and pulled like a balloon, but, securing all tightly, we covered ourselves with blankets, and resumed the portfolios. Heavy rain accompanied the norther, but in an hour the fierceness of the storm was over, and we broke camp and proceeded. As spring comes on, the northers lose much of their force and duration.

with himself—it was supposed to enjoy the warmth of their bodies—but he had never been an eye-witness of it, nor had he ever heard of a man's having been bitten on these occasions.

These were almost the first venomous snakes we had seen. But the torpid season was now over, and from this time forth they were so common as hardly to excite an exclamation, especially here, beyond the settlements, where they were tenfold numerous. Among them, the rattlesnake stands at the head; but as it cannot strike without coiling, and will not coil without rattling, it is, in reality, less dangerous than some others. In the settled parts of Texas it is common, but scarcely more so than in all the southern and western states. Its rattle is a piercing noise, like that of an August grasshopper, and cannot be mistaken. We had testimony in Eastern Texas of the power of charming said to reside in these reptiles, from Mr. Strather, on the Sabine, who had seen, while hunting in Alabama,

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SNAKES, INSECTS, AND GAME.

Before sunrise we had breakfasted, and were again in the saddle. Just after we had started, we met on the road, and killed, the largest rattlesnake I have ever seen; it was only five and a half

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feet long, but very thick, and carried thirteen rattles. When the soldiers overtook us, they said they had just killed a larger one. We saw several others, and their tracks crossing the road were very frequent. Woodland told us that they disliked to go into the wet grass, and it was for that reason we saw them so much on the edge of the dry road, while the dew stood on the leaves in the morning. In grassy land, at this time of day, they were generally *hanging* in bushes; this we also observed. On this account he always chose the heaviest grass to spread his blanket on for the night. He had several times been told that rattlesnakes had crept within the blanket of persons in the same camp

"a well-marked case." Coming from a little swamp, he heard a bird, upon a tree-trunk before him, in an unusual flutter; and,

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stopping to examine the cause, saw a huge rattlesnake coiled, with open mouth, at the foot of the tree, towards which the bird, in convulsions of fright, slowly descended. Keeping perfect quiet, he saw it gradually come within reach of the jaws, when it was seized with a jerk, and slowly swallowed.

I share, with many of mankind, a peculiar dread of serpents—and when on our return across this wilderness my horse stepped in the road close upon a huge specimen of this species, who struck, but fortunately did not wound him, I almost fell faint from the saddle. The Texan settlers seemed to care very little anywhere for snakes; and, indeed, they are perfectly right in ignoring them, as fatal accidents are so extremely rare. The physicians in San Antonio corroborated the general declaration on this point. We saw one patient who had been struck by a water-snake, in collecting "tula," for thatch, from the river edge. He was in a fair way, after three weeks' treatment, to lose an arm by erysipelatous sloughing and necrosis of the bones of the fore-arm, but no danger to life was apprehended. From what we could learn, more than one-half the accidents were followed by no consequences whatever, and a very small percentage, only, proved fatal. The immediate remedies were, for the profession, ammonia; for the people, whisky. A medical man from Illinois told us of a patient to whom he was called, "a lady, who was going out barefoot to milk, and was struck in the ankle, while letting down the bars," who instantly returned to the house and drank a pint of whisky. He contented himself with awaiting the result, and found the antidote real.

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PACIFIC RAILROAD.

It is across this forbidding country that it is proposed to build our southern railroad toward the Pacific. In respect of climate it has a certain advantage over the more northern routes. But impediments more formidable than winter snows are to be met. A principal obstacle occurs at the outset, in the total want of water upon the Staked Plains. Wood or coal might, if necessity demanded, be transported to suitable stations along the road, but a local water supply seems to be indispensable. With the design of removing, if possible, this preliminary objection, a party of engineers have been for two years at work, under orders of the Secretary of War, in ascertaining the practicability of boring artesian wells upon the plains. The results are interesting, but, as yet, afford no practical solution of the difficulty. Upon the parallel of thirty-two degrees, and fifteen miles east of the

Pecos, a first tube was sunk in 1855. Water was twice struck, first at three hundred and sixty feet, subsequently at six hundred and forty-one feet, but in neither case did it rise to within two hundred and forty feet of the surface. In 1856, a point, five miles further east, was chosen. The same streams were reached, and, at the depth of eight hundred and sixty feet a third, from which water rose to within one hundred and ten feet of the surface. The appropriation of forty thousand dollars being ex-

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hausted, operations have been discontinued. Captain Pope, who was in command, describes the geological formation as consisting of alternate strata of indurated clays and cretaceous marls, the latter, apparently, of fertilizing value. He also reports a novel source of fuel in the roots of the mesquit, which are found preserved beneath the soil, perfectly sound and hard, extending, sometimes, to the incredible depth of seventy feet.

Should further perseverance succeed in obtaining from this source a permanent and sufficient supply of water, and engineering skill produce a practicable means of crossing the gigantic cañons of the plains, there are still the rugged precipices of the Guadalupe mountains to be crossed before reaching the Rio Grande. Nor is the country beyond, though feasible so far as topographical considerations are concerned, better adapted to the support of a costly thoroughfare.

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Whether more advantageous routes can be found further north, it is not pertinent here to inquire; but, with these objections in view, the idea of a railroad, as a commercially economical project, from Texas to the Pacific, may be safely pronounced chimerical. In a military point of view, it may become desirable, and, if necessary, can be built; but the cost, both of construction and preservation, must first be counted.

STRAY LEAVES

FROM

AN ARCTIC JOURNAL;

OR,

EIGHTEEN MONTHS IN THE POLAR REGIONS,

IN SEARCH OF

SIR JOHN FRANKLIN'S EXPEDITION,

IN THE YEARS 1850-51.

BY LIEUT. SHERARD OSBORN,

COMMANDING H.M.S. VESSEL, "PIONEER."

Dedicated to Lady Franklin.

LONDON:

LONGMAN, BROWN, GREEN, AND LONGMANS,
1852.

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Captain Penny had only stayed a short time. He arrived on May the 4th. The prospect of an early season was most cheering, and then the worthy Herr produced a piece of paper directed to myself by my gallant friend Penny. He wrote in haste to say his squadron had arrived all well after a splendid run from Aberdeen: he was again off, and sent kind remembrances, dated May 4th.

This, at any rate, was joyful intelligence, and worth my journey to Disco; my heart leaped with joy, and I thought, at any rate, if we were late, he was full early.

After a long chat, we went for a stroll, in which a tree—yes! as I live, a tree—was discovered. Be not envious, ye men of Orkney, it stood full thirteen inches high, and was indigenous, being the dwarf birch tree, the monarch of an arctic forest! Stumbling upon the churchyard I should have indulged my taste for old tombstones had not the mosquitoes forbidden it; and, with a hurried glance at the names

of old hunters of fish, and departed Danes and Dutchmen, I ran for the beach, remarking that, whereas we in Europe evince respect for those who have preceded us to that bourne —

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"Where life's long journey turns to sleep,
Nor weary pilgrim wakes to weep —"

by placing stones around their last homes, in Greenland pieces of soft and ugly wood are substituted, although nature has strewn on every side masses of granite fit to form mausoleums for Pharaohs. Bad taste! I exclaimed; but that's not confined to Disco.

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There is something in last letters painful and choking; and I remember that I hardly knew which feeling most predominated in my breast,—sorrow and regret for those friends I had left behind me — or hope and joyful anticipation of meeting those before us in the "Erebus and Terror."

At any rate, I gave vent to them by climbing the rocky summit of Cape Shackleton, and throwing off my jacket, let the cold breeze allay the excitement of my mind.

Nothing strikes the traveller in the north more strongly than the perceptible repose of Nature, although the sun is still illumining the heavens, during those hours termed night. We, of course, who were unaccustomed to the constant light, were restless and unable to sleep; but the inhabitants of

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these regions, as well as the animals, retire to rest with as much regularity as is done in more southern climes; and the subdued tints of the heavens, as well as the heavy banking of clouds in the neighbourhood of the sun, gives to the arctic summer night a quietude as marked as it is pleasant. Across Baffin's Bay there was ice! ice! ice! on every side, small faint streaks of water here and there in the distance, with one cheering strip of it winding snake-like along the coast as far as eye could reach. "To-morrow!" I exclaimed, "we will be there." "Yes!" replied a friend, "but if the breeze freshens, Penny will reach it to-night!"

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In 1849, Mr. Henry Grinnell, a merchant of the United States, actuated by the purest philanthropy that ever influenced the heart of man, determined

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to devote a portion of his well-deserved wealth to the noble purpose of relieving Sir John Franklin,

who, it was much to be feared, from the desponding tone of a portion of the English press on Sir James Ross's failure, was likely to be left unsought for in 1850. He therefore, at his sole expense, purchased two vessels, one of 140 tons, the "Advance," the other 90 tons, the "Rescue," and, having strengthened, provisioned, and equipped them, Mr. Grennell then placed them under the control of his government, in order that they might be commanded by naval officers and sail under naval discipline. The American Congress passed the necessary acts, and Lieutenant E. De Haven, who had seen service in the Antarctic seas, took command of the "Advance," as the leader of the expedition, and another distinguished officer, Mr. Griffin, hoisted his pendant in the "Rescue." On the 23rd May, 1850, the two vessels sailed from New York, touching at Disco, where I am sorry to say they found my worthy friend "Herr Agar" to have died shortly after my visit; they reached the pack of Melville Bay on the 7th July, and, tightly beset until the 23rd, they did not reach Cape York until early in August.

The 7th August they reached Cape Dudley

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Digges! (at that time we were still beset off Cape Walker in Melville Bay), thence they stood to the south-west, until they reached the West water.

On the 18th August, when we had a thick fog and almost a calm off Possession Bay, the American squadron was in a severe gale in Lancaster Sound; and on the 25th August, after visiting Leopold Island, the gallant Americans, reached Cape Riley close on the heels of the "Assistance" and "Intrepid."

From that time we have shown that they lost no opportunity of pushing ahead; and if progress depended alone upon skill and intrepidity, our go-a-head friends would have given us a hard tussle for the laurels to be won in the Arctic Regions.

As a proof of the disinterestedness of their motives, men as well as officers, I was charmed to hear that before sailing from America they had signed a bond not to claim, under any circumstances, the 20,000*l.* reward the British Government had offered for Franklin's rescue; we, I am sorry to say, had acted differently. America had plucked a rose from our brows; but in such generous enterprise, we for the most part felt that no narrow-minded national prejudices could enter, and I gloried in

the thought that the men who had so nobly borne themselves, as well as he, the princely merchant who

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had done his best to assist the widow and orphan to recover those for whom they had so long hoped and wept, were men who spoke our language, and came from one parent-stock, — a race whose home is on the great waters.

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For some time after the sun had ceased to visit our heavens, the southern side of the horizon, for a

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few hours at noon, was strongly illumined, the sky being shaded from deep and rosy red through all the most delicate tints of pink and blue, until, in the north, a cold bluish-black scowled angrily over the pale mountains, who, in widowed loneliness, had drawn their cowls of snow around, and, uncheered by the roseate kiss of the bridegroom sun, seemed to mourn over the silence and darkness at their feet. Such was a fine day in November, and through the grey twilight the dark forms of our people, as they traversed the floe, or scaled the cliffs of Griffith's Island, or, may be, occasionally hunted a bear, completed the scene.

Charmed as we were with the evanescent colouring of our sky on a fine day, it was in loveliness far surpassed by the exceeding beauty of arctic moonlight. Daylight but served to show the bleakness of frozen sea and land; but a full, silvery moon, wheeling around the zenith for several days and nights, threw a poetry over every thing, which reached and glowed in the heart, in spite of intense frost and biting breeze.

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About one o'clock on the morning of the 26th August, I was aroused and told that Esquimaux were coming off on dog-sledges.

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I need hardly say we loaded them with presents: their ecstasy exceeded all bounds when each was presented with a boathook staff, a piece of wood some twelve feet long. They danced, shouted, and laughed again with astonishment at possessing such a prize. Wood was evidently with them a scarce article; they had it not even to construct sledges with. York, the interpreter, had before told us they had no canoes for want of it; and they seemed perfectly incapable of understanding that our ships and masts were altogether made of wood.

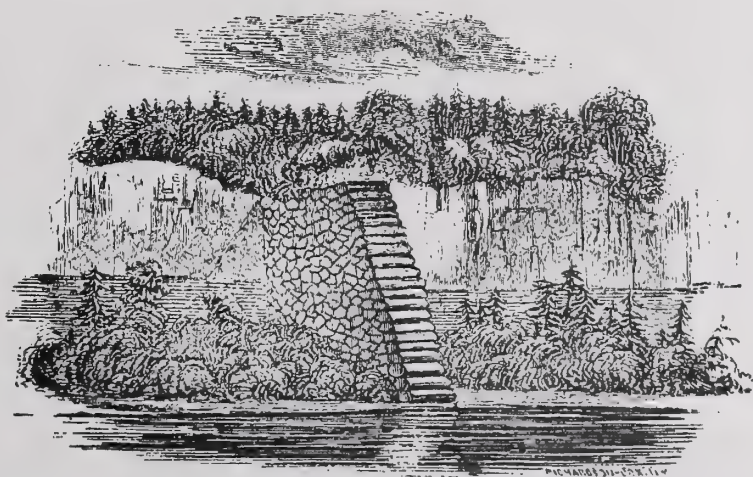
REPORT
OF A
GEOLOGICAL SURVEY
OF
WISCONSIN, IOWA, AND MINNESOTA;
AND INCIDENTALLY OF
A PORTION OF NEBRASKA TERRITORY.

MADE UNDER INSTRUCTIONS FROM THE UNITED STATES TREASURY DEPARTMENT.

BY

DAVID DALE OWEN,

UNITED STATES GEOLOGIST.



PHILADELPHIA:
LIPPINCOTT, GRAMBO & CO.
1852.

true "Pomme de Terre" of the French voyageurs, and the "Mdo," or wild potato of the Sioux Indians. By the latter name it is extensively used as an article of diet. It grows in great abundance, and of superior quality, on the banks of the St. Peter's. When properly cooked, it is by no means unpalatable. *Amphicarpæa monoica*, (Nutt.) August. Rich woods, bearing underground pods, like the peanut of commerce. *Desmodium nudiflorum*, (D. C.) August. Woods, St. Croix. *Desmodium acuminatum*, (D. C.) August. St. Croix. *Desmodium Canadense*, (D. C.) July. Moist banks of streams. *Lespedeza capitata*, (Michx.) August. Dry prairies, Iowa and Minnesota. *Astragalus caryocarpus*, (Ker.) May. Gravelly ridges in the interior of Iowa, Fort Snelling, at the junction of the Mississippi and St. Peter's Rivers, and abundant on the latter stream, being a characteristic plant of the peculiar drift deposit of that region. The fruit, which is a pod, closely resembles a plum in external appearance, from which fact it has received the common name of "ground-plum." The thick fleshy exterior is highly charged with moisture, having the usual taste of the pea tribe, and is frequently used to allay the thirst of the traveller on the great western plains. *Astragalus Canadensis*, (L.) July. Banks of the Mississippi and St. Peter's Rivers. *Oxytropis Lamberti*, (Pursh.) June. Upper St. Peter's, on drift ridges. *Glycyrrhiza lepidota*, (Nutt.) June. "Wild liquorice." Banks of the Blue Earth, St. Peter's, and St. Croix Rivers. Possessing some of the sensible qualities of the commercial liquorice, without its sweetness. *Tephrosia Virginiana*, (Pers.) July. Sandy soil, Davenport, Iowa. *Amorpha fruticosa*, (L.) May. A handsome shrub, edging river-banks throughout the Northwest. *Amorpha nana*, (Nutt.) June 18th. High prairies on Blue Earth River. A characteristic plant of woodless, grassy hills on the Missouri, often diffused, as Mr. Nuttall remarks, "like heath in Europe, over many acres in succession, and is the only upland shrub apparently capable of withstanding the peculiarities of this climate." (Nutt., *Genera*, vol. ii. p. 91.) *Amorpha canescens*, (Nutt.) July. This is the noted "lead-plant" of Iowa and Wisconsin. Its value as a mineral indication may probably be summed up in this. It attaches itself with most luxuriance to rocky crevices and spots about which the peculiar dry earth, indicating a mineral vein, exists, and the miner is thus guided in making his excavations. Farther than this any definite relation with the lead-bearing rock is sufficiently disproved by the extensive geographical range of this plant, from British America to Texas. *Psoralea argophylla*, (Pursh.) July. High prairies in Iowa and Minnesota. A characteristic plant, with silvery foliage. *Psoralea esculenta*, (Pursh.) June 3d. Gravelly ridges of the St. Peter's. This is the valuable plant known as the "Indian turnip,"—"Pomme de Prairie," of the French voyageurs; "Tipsinah" of the Sioux Indians. It occurs over a wide range of country between the Mississippi and the Rocky Mountains, and is a characteristic plant of the "Coteau des Prairies." The root, frequently attaining the size of a hen's egg, is of a regular, cylindric, ovoid shape, consisting of a thick leathery envelope, easily separating when fresh from its smooth internal part. The latter is of friable texture, except towards the axis, where some ligneous fibres are intermixed. When dry, it acquires a sweetish taste, and is easily pulverized, affording a light, starchy flour, suitable for all the uses of the ordinary article. When growing its aspect is that of a Lupine. It selects a dry, gravelly, but not barren soil, and is well worthy the attention of cultivators, as an interesting production of the Northwest. *Petalostemon violaceum*, (Michx.) June. Dry hills throughout the Northwest. *Petalostemon candidum*, (Michx.) August. Dry prairies. *Petalostemon villosum*, (Nutt.) Sandy banks. "Tra-verse des Sioux," Falls of St. Anthony, Barrens of St. Croix. A very elegant species in flower and foliage. *Trifolium reflexum*, (L.) June. Buffalo clover. Low grounds. Iowa. *Trifolium repens*, (L.) St. Peter's and St. Croix. *Lupinus perennis*, (L.) St. Croix Barrens. *Baptisia leucantha*, (Torr. & Gr.) July. Rich soil, Davenport and St. Croix. *Baptisia leucophœa*, (Nutt.) May. Dry prairies. Iowa. *Cercis Canadensis*, (L.) April. "Red-bud." Banks of the Mississippi. Davenport and Rock Island. *Cassia chamæcrista*, (L.) July. Sensitive pea. Sandy soil. Iowa.

ROSACEÆ.—*Prunus Americana*, (Marsh.) Wild plum. Forming thickets. Mississippi and St. Croix. Generally producing an abundance of fruit. *Cerassus pumila*, (Michx.) Sand-cherry. Sandy banks of Lake St. Croix. Beach of Lake Superior. *Cerassus Pennsylvanica*, (Loisel.) Bird cherry. St. Croix. *Cerassus Virginiana*, (D. C.) Choke cherry. St. Croix. *Spiræa opulifolia*, (L.) June. Rocky river banks, Iowa. *Spiræa salicifolia*, (L.) July. Wet places. St. Peter's and St. Croix. *Spiræa tomentosa*, (L.) July. Margins of lakes. Minnesota. *Agrimonia Eupatoria*, (L.) August. Waste places. St. Croix. *Geum Virginianum*, (L.) June. Shady hills. St. Peter's. *Geum strictum*, (Ait.) Moist places. St. Peter's. *Geum triflorum*, (Pursh.) May. Head of Lake St. Croix, Fort Snelling, and St. Peter's. This fine species, particularly beautiful in its plumed fruit, is well worthy to usurp the place of

common Anise, belonging to a very distinct family, which this plant so closely resembles in taste. *Lophanthus nepetoides*, (Benth.) Falls of St. Croix. *Lophanthus scrophularifolius*, (Benth.) All three of the above species are found side by side at the Falls of St. Croix, and exhibit a fine example of gradation of specific characters. *Pycnanthemum pilosum*, (Nutt.) Dry hills. Iowa. *Pycnanthemum lanceolatum*, (Pursh.) Thickets in Iowa and Minnesota. *Prunella vulgaris*, (L.) Common Heal-all. *Scutellaria parvula*, (Michx.) May. Gravelly borders of the Upper Mississippi. *Scutellaria galericulata*, (L.) Wet places. St. Croix. *Scutellaria laterifolia*, (L.) Wet places. Iowa and Minnesota. *Scutellaria versicolor*, (Nutt.) Copses. Davenport, Iowa. *Physostegia Virginiana*, (Benth.) July. River margins. Upper Mississippi, St. Peter's, and St. Croix. *Leonurus Cardiaca*, (L.) Mother-wort. About houses. *Galeopsis Tetrabit*, (L.) Lake Superior. *Stachys hispida*, (Pursh.) Margins of rushy ponds. Iowa. *Teucrium Canadense*, (L.) Low grounds. St. Croix.

BORAGINACEÆ.—*Onosmodium molle*, (Michx.) About gopher-holes, on prairies. Iowa and Minnesota. *Lithospermum latifolium*, (Michx.) May. Rock Island, Illinois. *Batschia Gmelini*, (Michx.) June. Dry, sandy ridges. Iowa and Minnesota. *Batschia canescens*, (Michx.) Hoary Puccoon. More abundant than the preceding species, and growing on richer soil. Its root furnishes a common dye, used by the Indians. *Batschia longiflora*, (Nutt.) May. Banks of the Mississippi River, near Davenport, Iowa. *Mertensia Virginica*, (D. C.) April. Lung-wort. Davenport. *Echinospermum Lappula*, (Lehm.) Stick-seed. Waste places. *Cynoglossum officinale*, (L.) Hound's-tongue. Roadsides. *Cynoglossum Virginicum*, (L.) Portage between the St. Croix and Bois Brulé Rivers. *Cynoglossum Morisoni*, (D. C.) Waste places about villages. Iowa.

HYDROPHYLLACEÆ.—*Hydrophyllum Virginicum*, (L.) June. Rich woods. Iowa and Minnesota. *Hydrophyllum appendiculatum*, (Michx.) June. Copses. Iowa. *Ellisia ambigua*, (Nutt.) May. An evanescent weed, common about cultivated fields and gopher-holes. Iowa and Minnesota.

POLEMONIACEÆ.—*Polemonium reptans*, (L.) May. Shady places, near Davenport, Iowa. *Phlox maculata*, (L.) June. Wet places on prairies. Iowa. *Phlox pilosa*, (L.) June. Common on prairies throughout the Northwest. *Phlox divaricata*, (L.) April. Shady hillsides. Iowa.

CONVOLVULACEÆ.—*Calystegia sepium*, (R. Br.) Bindweed. Copses. Iowa and Minnesota. *Cuscuta Gronovii*, (Willd.) Common dodder. Low grounds. *Cuscuta glomerata*, (Choisy.) Mississippi bottoms, near Rock Island, Illinois.

SOLANACEÆ.—*Datura Stramonium*, (L.) Waste places, interior of Iowa. A close attendant on the steps of the pioneer physician. *Physalis viscosa*, (L.) Dry fields, Iowa and St. Peter's. A narrow-leaved variety, which is often confounded with the *P. lanceolata* of Michaux, is frequently met with. *Solanum nigrum*, (L.) Waste places. St. Croix.

GENTIANACEÆ.—*Gentiana quinqueflora*, (Lam.) Dry prairies, Iowa. *Gentiana crinita*, (Frœl.) Fringed gentian. Moist grounds, St. Croix. *Gentiana Saponaria*, (L.) Moist river banks. Upper St. Croix. A pure white variety is often met with. *Menyanthes trifoliata*, (L.) Bogs. St. Croix and St. Peter's. *Halenia deflexa*, (Griseb.) Bois Brulé River bank and south shore of Lake Superior.

APOCYNACEÆ.—*Apocynum androsæmifolium*, (L.) June. St. Croix. *Apocynum cannabinum*, (L.) River-banks throughout the Northwest.

ASCLEPIADACEÆ.—*Asclepias Cornuti*, (De Caisne.) Copses of the Northwest. *Asclepias phytolacoides*, (Pursh.) Copses. St. Croix. *Asclepias purpurascens*, (L.) Hills. Davenport, Iowa. *Asclepias obtusifolia*, (Michx.) Dry, sandy prairies, Iowa. *Asclepias Meadii*, (Torr.) June. Of a singular isolated habit, but not rare on dry, rolling prairies. Iowa. *Asclepias incarnata*, (L.) Swamps. Iowa and Minnesota. *Asclepias tuberosa*, (L.) Butterfly-weed. June. Dry prairies. Iowa and Minnesota. *Asclepias verticillata*, (L.) Dry hills. Davenport, Iowa. *Acerates longifolia*, (Ell.) Moist places, Iowa. *Acerates viridiflora*, (Ell.) June. Dry hills and prairies. Iowa and Minnesota.

OLEACEÆ.—Several species of Ash (*Fraxinus*), were observed, but I have not the means at hand for identifying them.

ARISTOLOCHIACEÆ.—*Asarum Canadense*, (L.) Wild ginger. Rich woods. Iowa and Minnesota.

CHENOPODIACEÆ.—*Chenopodium album*, (L.) Cultivated fields. Iowa. *Chenopodium hybridum*, (L.) St. Croix. *Blitum capitatum*, (L.) La Pointe. Lake Superior. *Aconida cannabina*, (L.) St. Croix. River margins.

AMARANTHACEÆ.—*Amaranthus hybridus*, (L.) Fields and gopher-holes. Iowa and Minnesota. *Amaranthus græcizans*, (L.) A weed springing up wherever there is a garden.

JOURNEY TO ARARAT.

BY

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With Map and Wood Cuts.

TRANSLATED

BY W. D. COOLEY.



NEW-YORK:

HARPER & BROTHERS, PUBLISHERS,
82 CLIFF STREET.

1846.

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Immediately after crossing the Don we had occasion to congratulate ourselves on the hospitable reception we experienced in the hutor or estate of Protopopskaia: we were next entertained, about sixteen miles farther on the banks of the Manech, in the hutor of Balabin, belonging to two retired officers of Kossaks. From this point we followed

the course of the Manech, as closely as we could, proceeding from one to another of the Kalmuk ouls (encampments) scattered over the steppe, where

we invariably and readily obtained the necessary horses and guides on presenting our papers. For the purpose of measuring the fall of the Manech throughout this entire journey, it was absolutely necessary that I should be constantly at a distance of ten or fourteen miles from my fellow-labourer, so that we might arrive each at his own station at a certain time, and after making our observations with the barometer, push forward to the next points, so as to repeat the same operations at the same moment. Our plan was to proceed thus, with an uninterrupted chain of results, as far as circumstances might permit us to advance, till we should extend them—as I first wished and expected—to the Caspian Sea, meeting only at night, when we deliberated upon our respective duties for the ensuing day. Such was the grand object of the present excursion, a detailed account of which will be found in one of the scientific memoirs appended to this work. Consequently, we had but little time or attention to bestow on other pursuits. Still, it was difficult to avoid dwelling with a feeling of interest on the national characteristics of the Kalmuks, the unsophisticated and inoffensive people of the steppe.

The Kalmuk mode of life is systematically nomadic, and to this they cling with all the tenacity of inveterate habit. What in another age and under different circumstances would have been but common necessity, has at present, when neither opportunities nor inducements can be wanting to tempt them to adopt a settled mode of life, become a keenly-felt want and a source of gratification. The peculiarities of their religious notions, language, and manners are too distinctive to justify any expectation that they could be so far influenced by the example of neighbouring nations

as to establish themselves in fixed habitations. So great is their attachment to a roving life, that I was assured by one of their priests that it would be looked upon as a sort of violation of religious principle if they were even to attempt to provide a supply of hay in summer to secure their horses and oxen from the danger of perishing of hunger in the winter, because it would seem an approximation to habits to which their national practices are too obstinately opposed.

To this I never knew but one exception, in the case of a Kalmuk prince, with whom I formed an acquaintance a year afterward in Astrakhan. This personage, whose name was Serbechab Timeniev,* and who was the chief of the Khotoutusk Uluss, or horde, had formed a regular settlement in the neighbourhood of that city. He had there built himself a house in the European style, with commodious apartments, billiard-room, kitchen, cellars, &c., and maintained a large establishment of servants, principally Kalmuks, though he had been obliged to commit the management of his stud of horses to a German by birth. The requisite out-

buildings and kibitkas, together with the very tasteful Kalmuk church which he had erected, gave the whole very much the air of a nobleman's country residence, to which the frank and hospitable disposition of the owner was ever ready to welcome the respectable and well-informed stranger. The gratification I derived from this visit was still further enhanced by my having the good fortune to encounter Professor Hansteen, of Christiania, at the prince's, upon his return from Siberia, and my own from Ararat.

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If to these articles of diet we add the flesh of their cattle, especially the sheep, which they eat boiled, roasted, and baked, we shall obtain a tolerably fair idea of the requisites of a Kalmuk larder.

At the same time, it cannot but appear surprising that a race so primitive and inoffensive should confine themselves exclusively to an animal diet; for even the very flour necessary for household consumption is only to be procured, in exceedingly small quantities, by a disadvantageous barter with the Russians.

The Kalmuks make no use whatever of vegetables, the herbs of the steppe, or fruits; probably because their production in sufficient abundance might impose upon them the necessity of attending to the cultivation of the soil, and this, were it only for a single season, might interfere with the independence of their roving life. Their only concern is their flocks and herds, which they find adequate to the supply of all their wants. Of the hair or fleeces they make cushions, felt-cloth, ropes, and lines; the skins they convert into articles of dress, or use as coverlets, while the leather, which is rudely dressed with fermented milk and lime, serves them under a variety of forms, in the construction of their kibitkas, harness for their cattle, and in the formation of canteens of every size, called *berba*, made of leather pressed. The milk supplies them with brandy and materials for tanning, the flesh with food, and the dung even furnishes them with fuel. It is also by means of his flocks and herds that the Kalmuk contrives to provide himself with linen cloth, cotton stuffs, salt, and meal, which he gets in exchange for camels (of the two-humped species), and horses, reared by him in considerable numbers, and which are of a light, swift, and hardy breed.

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The cattle being left to graze upon the steppe in summer, and to find their living where and how they can in the winter, the life of the Kalmuk is inactive. The migration from the winter to the summer pastures constitutes the only important event in his monotonous existence. This want of all social excitements for the mind, this uniformity in his intellectual and physical life, renders it in a great degree comprehensible how a people, endowed with so many estimable qualities of mind and body, should become the votaries of the idle and fantastic religious dogmas which prevail, at least, among the hordes occupying this quarter of the steppe.*

These Kalmuks profess the religion of Buddah,

which had its origin in India, but, having been superseded by the doctrines of the Brahmins, found its way into Mongolia and Tibet. It is a sort of pantheism, not at all easy to comprehend: rejecting the principle of one Almighty Being, the creator of heaven and earth, it nevertheless asserts the essential identity of God with the material world, neither placed above it, nor existing before it, but proceeding with it out of immeasurable space. Among all animated beings, of which there are good and bad, there is, according to this creed, a consecutive subordination of rank, the several gradations of which must be passed by each in long intervals of time. The highest place is that of Buddah, by whom, however, we are not to understand any individual impersonation of God, but merely the attributes of the Divine nature, which it is the destiny of every being to attain, according to the measure of his good works. This metempsychosis is to be conceived as an existence in the "tranquil ocean of illimitable space," on the shores

* Zwick's Journey from Sarepta, 1827.

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of which the Buddah can alone find rest; but the attainment of this goal by works of charity is the result of the revelation, or kind of redemption, which all beings enjoy once in a thousand years, through the perfection of a Buddah, who is the ruler and benefactor of the world during the period assigned for his reign.

We should be much mistaken, however, if we were to suppose that these or any other settled notions of religion would be found universally prevailing among the hordes in the steppe of the Manech. Respecting the fundamental tenet of all religion, the belief in the existence of a Divine Being, the ideas of the generality of them would be found contradictory and unsettled. We might even detect here and there some obscure traces of intermixture with the doctrines of the Christian faith; as, for instance, the idea of the god Sengir, of whom I heard it said by some of the Kalmuks of the Manech that he was the highest of all, and born of the right side of the mother of God; a persuasion which was even avowed in my presence by Serbechab Timeniev, at Astrakhan.

But how is it possible that the Kalmuks could arrive at any fixed or just notions upon such a subject, when they not only receive no religious instruction, but are without any regular performance of religious worship, even on the Sabbath; while on their feast-days, when they are in the habit of attending the house of God, they hear nothing but the repetition of forms of prayer, and the reading of the Scriptures in a language they cannot understand, and this in conformity with a ritual which would appear to have as little meaning or attraction for the initiated as for the laity? Priests, and places dedicated to the service of religion, are not to be met with in every khatun, as these migratory

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villages are called; the latter are found scattered here and there under the name of convents. These are readily discovered by the traveller even at a distance, when he remarks, on an open site, in the middle of the khatun, ten or twelve kibitkas larger

and neater than the rest, which enclose a circular or oval space, but without a human being at the usual domestic occupations, or any cattle feeding. "That is a convent," was an expression that struck me forcibly the first time I heard it in the steppe. Would it not, indeed, have been a touching sight, amid the open plain, and under the vault of heaven, to behold within the enclosure of a few humble hospitable tents a building dedicated to the honour of the Deity, by an inoffensive community, on the spot where the wants of their peaceful flocks demanded their temporary abode, and where they had displayed upon it all the embellishments that the narrow circle within which their own desires were confined permitted them to bestow, could we but persuade ourselves, at the same time, that the worshippers felt the privilege to which they were admitted, in presenting the offering of a true and heartfelt devotion in the temple of their God?

Alas! how soon are such ideas dissipated upon our first entrance into the tabernacle! Here hang a number of distorted representations of their divinities on the walls; there is reverentially preserved a brazen idol, cast for their principal god, who is generally represented as a female, like many others among them, and often with four or six arms, and similar hideous deformities of shape. In another place lie piled in chests their sacred writings, obtained from Mongolia or Tibet, and which are intelligible, or rather legible, to none but the initiated—that is to say, their high priest or lama, and the officiating minister or gellong.

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It must be confessed that in this, as in all other cases, some praiseworthy exceptions will be found; but I only speak here of the general impressions which are made by Georgian society upon a stranger, and am therefore obliged to aver that there is a total want of industry, activity, and domestic feeling everywhere apparent; and though cleanliness and love of order have, in a few instances, gained a footing among the higher class, it is yet only as objects of imitation and luxury, not of necessity and habit.

The venerable existence of Tiflis in an Oriental form gives it another claim upon the sympathy of Europeans, when we reflect that it has found means to maintain its nationality, by an enormous expenditure of life, for 2000 years, against the Persians, Turks, and Caucasians; and it is only now, and by friendly intercourse with strangers, that that independence is threatened which hitherto has baffled the utmost efforts of Mohammedan and Pagan. Notwithstanding the presence and example of numerous strangers from Russia, Germany, and France, the Georgian still adheres to his own primitive agricultural implements, and defective system of cultivation in the field, the vineyard, and the garden. He is not even so far advanced in the construction of his mills as to supply himself with a good quality of flour: this has to be procured from the Russians. His antiquated wheel-carriages are still as clumsy and rude as they were in the Golden Age. He still, as of old, shaves off all the hair from his head, which he covers, when he goes into the broiling sun, with a heavy cap of sheepskin, well calculated, when aided by excesses in

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the use of wine, to produce a constant determination of blood to the brain. The native of Tiflis still makes it a daily practice to indulge, as of old, in the use of his disgustingly filthy sulphureous warm bath, where he exposes his body for hours to the heating and enervating influence of the vapour.

Yet all this is national, and sanctioned by immemorial usage. What are we to think, though, of the merchant of Tiflis, with his stiff collar and Oriental robes? What of a coquetish Georgian lady, with a French capote instead of the veil of the olden time?

Why must the houses of Tiflis, with their well-contrived flat roofs of clay, overgrown with weeds, to which the city is indebted for immunity from fires—though, even here, a violent storm of lightning, occurring during the height of the summer, will occasionally set the dry grass upon the housetops in a blaze—why, I ask, should this roof of the southern Asiatic, the place of his recreation and exercise, give place to the high, sloped tiling of the North?

But the Georgian will one day have to deplore the total downfall of Georgian customs, under the influence of modern refinement; the main cause of all which changes must be sought in this truth, that no characteristics of a people, unless founded on pure religious feelings, can ever draw down a permanent blessing, or command respect; and this is the basis which the Georgian nationality has failed to establish.

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There is one circumstance which, in my opinion, also contributes not a little to maintain a degree of coolness in the apartments of an Eastern house; that is, the peculiar roof, if we may be allowed to give this name to the uppermost floor or terrace of their houses. This is formed of a layer of earth and stiff clay, about two feet thick, quite even, but inclined by about two inches to one side, so that during a heavy shower of rain the water may not run off at all sides, but be directed through a couple

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of openings in the parapet, which rises about a foot above the level of the roof. This bed of earth acts hygrometrically upon the atmosphere, imbibing the damps by night, which are again evaporated in the heat of the day, and, by a known law of physics, has a perceptible effect in cooling the air; whereas, under the usual European roof, which has been most unadvisedly introduced by foreigners into Tiflis, an actual reverberation of the heat takes place. These flat terraces are, moreover, usually overgrown with weeds; it is said to be particularly the *Lepidium vesicarium* which is there met with.* This becomes scorched in summer, and then is set on fire to get rid of the dry stalks, so that the fire, which soon seizes on this inflammable vegetable matter, will often present the startling and beautiful spectacle of a wide body of flame sweeping over the city in the night.

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LADY'S VOYAGE

ROUND

THE WORLD:

A SELECTED TRANSLATION FROM THE GERMAN

OF

IDA PFEIFFER.

BY MRS. PERCY SINNETT.

NEW YORK:

HARPER & BROTHERS, PUBLISHERS,

No. 82 CLIFF ST.

1852.

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32 BRAZIL

At sunset the day's labor ends. The negroes then range themselves before the master's house and are counted, after which there is a short prayer, and then comes the evening meal, consisting of bacon, beans, *carna secca*, and manioc flour. At sunrise they all assemble again, are again counted, and then, after prayers and breakfast, go again to work.

In this, as well as in many other fazendas, vendas, and private houses, I had occasion to observe that the negroes are by no means treated with the severity which we in Europe imagine.

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preserved from the ants and barates. The children even of rich people go without shoes or stockings, but before they go to bed it is necessary to examine their little feet, and take out the sand-fleas that may have nestled in them—an operation which is commonly performed by the elder negro children with a pin.

I took leave of my kind hostess in good time in the morning, and she packed up carefully for me a roast fowl, manioc flour, and some cheese, so that I set out again well provided.

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The priest on his side generally makes his mind easy that by this holy action he has won the soul for heaven, and does not, therefore, give himself any superfluous trouble about the morals of his new Christians. The Puri seldom alters any thing in his old customs concerning marriage and other points. Their language is extremely poor, and they have no method of expressing number but by repeating one, two—one, two, as many times as may be required. For yesterday, to-day, and to-morrow they have only one word, and they express the variety of meaning by pointing backward for yesterday, forward for to-morrow, and over the head for the passing day.

They are not overtasked; they go about it in an easy leisurely manner, and they are very well fed. Their children are actually the play-fellows of the masters, and they all romp and tumble about together. There may be cases where slaves may be over severely or unjustly punished; but we have instances of injustice even in Europe. I am certainly an enemy to slavery, and should greet its abolition with infinite joy; but I must nevertheless repeat my assertion that the negro slave, under the protection of law, has a better lot than the free fellow in Egypt, or than many peasants in Europe.

The arrangement of these fazendas is extremely simple. The windows are without glass, and closed at night only by wooden shutters. It is not uncommon for the one ceiling to extend over all the apartments, which are then separated only by low partitions, so that you can hear every word and almost every breath of your neighbor, especially when he is asleep. The furniture is equally simple—a large dining-table, some divans stuffed with straw, and a few chairs. The clothes usually hang round the walls, and the linen only is put away in tin chests, in order to be

The Puris are said to have an extraordinary keenness of scent, so much so that they are employed to scent out runaway negroes, in which task, unless a stream of running water intervene, so that the fugitive can walk or swim, they scarcely ever fail. They will also, for a very trifling reward, perform very hard work, such as cutting wood; but there must be no attempt to constrain them, as they are conscious they are free men, and they can seldom be induced to work till they are half starved. I visited all the huts at this place, and as my guide trumpeted forth my praises as a woman of astonishing learning, I had soon a considerable number of patients asking for medical advice.

44 TAHITI

ring; he took it, smelled it, and then shook his head and returned it to me, giving me to understand that it was not gold. He then remarked a ring on my finger, and after smelling it also, signified that he would accept of that one. I am told they can always distinguish real gold by the smell.

On landing, I went in vain from house to house to procure some kind of lodging; but as the town consists only of a row of little wooden cottages round the harbor (with the woods immediately behind them), and even officers of rank have to put up with a wretched lodging in Indian huts, I was for some time unable to find a place where I could lay my head. At length I procured it, in the most literal acceptation, in the house of a carpenter,—a house consisting of one room, in which his family of four persons already lived; I obtained leave to deposit myself in a corner behind the door, in a space exactly six feet long and four broad; the floor was not boarded, the walls were only palisades, and of chair or bedstead there was no question.

Tahiti, as is known, is now under the protection of the French, who are building a handsome house for Queen Pomare, and allow her a yearly pension of 25,000 francs; but she is not allowed to receive any stranger without their permission. There were several of their ships in the harbor, and the place was full of French soldiers; a circumstance which, as far as I could perceive, did not seem likely to improve greatly the morals of the inhabitants. The people have acquired a number of new wants, in consequence of which the eagerness for money has greatly increased among them; and what is worse, as they are by no means fond of work, they make their wives, daughters, and sisters earn money for them. The women have no objection, for they get dress and ornaments on what they consider easy terms; and the house of almost every French officer is a rendezvous for these native beauties, who are to be seen going in and out at all times of the day, and even joining them in public.

62 CHINA

It is exceedingly difficult, almost impossible, for a foreigner to give any very accurate information of Chinese habits and customs, but I saw all I possibly could, never missed an opportunity of mingling with the people, and carefully noted down all I saw. One morning, as I was going out, I met fifteen criminals all bearing the *Cang-gue*, or wooden yoke, in which they are led about the streets as a spectacle to the people. The *Cang-gue* consists of two large pieces of wood fitting into each other and having one to three openings, through which the head and one or both hands are drawn, according to the greatness of the crime. Such a yoke weighs from fifty to a hundred pounds, and weighs

so heavily upon the back and shoulders that the poor criminal is unable to feed himself, and must wait till some compassionate person lifts the food to his mouth: such a punishment is inflicted for periods varying from a few days to several months, and in the latter case it is almost always fatal.

Another punishment, beating with a bamboo stick, if given on a tender part of the body, often causes death after the fifteenth stroke. Some of the punishments are of such hideous severity that our capital punishments of strangling or beheading seem mild in comparison: the Chinese endeavor to obtain the ends of justice by flaying alive, crushing the limbs, cutting the sinews of the feet, &c., and I was told that in certain cases criminals are sawed in two or starved to death. In the first case the poor wretch is pressed between two planks and sawed lengthways, in the second buried up to his chin in the earth and so left till death puts an end to his sufferings, or the *Cang-gue* is put on him and from day to day less and less food given him, till at last it is reduced to a single grain of rice.

In the year 1846 four thousand men were beheaded in Canton; it is true they were the criminals of two provinces which together

reckon nineteen millions of inhabitants, yet it is a frightful number. Were the criminals really so many, or is the punishment of death so lightly inflicted, or is both the case?

I came once by chance upon the place of execution and saw,

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to my unspeakable horror, a long row of bleeding heads set upon poles. The relations are permitted to remove the bodies.

The population of China consists of many and very different races, whose characteristics I am, unfortunately, unable to give, on account of the shortness of my stay in China. The people whom I saw in Canton, Hong Kong, and Macao were of middling stature; the countryman, the porter, the workman, is much sun-burnt; the upper classes, generally white-skinned. The face is broad, the eyes small, oblique, far apart, the nose broad, and the mouth wide. The fingers of many I found to be extraordinarily long and thin. Aristocratic nails are generally half an inch long; one man I saw who had them above an inch in length, but only on the left hand: with this hand he was unable to lift a flat object without laying the hand flat upon it and clutching it between the fingers. Women of rank are generally inclined to corpulence,

which is greatly admired in man or woman.

Although I had heard so much of the little feet of the Chinese women, the first sight of one excited my highest astonishment. The sight of these feet *in natura* was procured me by a missionary's wife, Madame Balt. The four smaller toes seemed to me grown into the foot; the great toe was left in its natural position.

The forepart of the foot was so tightly bound with strong broad ligatures that all the growth is forced into height instead of length and breadth, and formed a thick lump at the ankle; the under part measured scarcely four inches long and an inch and a half wide. The foot is constantly bound up in white linen or silk and strong broad ribbons, and stuck in a very high-heeled shoe.

To my surprise these crippled fair ones tripped about with tolerable quickness; to be sure they waddled like geese, but they did manage to get up and down stairs without the help of a stick.

The boat-dwellers being the poorest, are the only class of Chinese who do not cultivate this peculiar species of beauty. In families of rank all the girls are condemned to it, in the lower classes only the eldest daughter. The value of a bride depends upon the smallness of her foot.

218 TURKEY

All these Turkish towns are much alike, and there is little to be said about them. The streets are dirty, the houses built of mud or unburnt brick, the shops wretched booths, the people disgustingly dirty, and the women increase their natural ugliness by dyeing their hair and nails red-brown with henna, and tattooing their hands and arms. At five-and-twenty they look quite old.

On the 25th of June we reached a village which was the home of our leader, and his house lay, with several others, in a large dirty court-yard, surrounded by a wall that had but a single entrance. This court resembled a regular camp, for all the inhabitants, as well as their horses and asses, were lying sleeping about it. Our animals recognized their own places, and trotted so fast by the sleepers that I was quite in fear for them. However, these creatures are very careful, and the men knew it, and remained quietly where they were.

My Arab had been three weeks absent, and had returned now for a very short time, and except one little old woman no one of his family got up to greet him. Even the said old lady, whom I took for his mother, did not speak to him a word of welcome or attempt to help him, but merely trotted along by his side, so that I thought she might almost as well have lain sleeping with the rest.

The Arab's house consisted of one large lofty apartment, divided into three portions by two middle walls that did not reach quite to the front. Each of these divisions was thirty feet long by about nine feet broad, and served as the dwelling of a family. The light came through the common entrance, and two holes at

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the top of the front wall. In one of these compartments a place was assigned to me where I could remain during the day; and my first study was directed to ascertaining the relations of the family with whom I was to live. I wanted to ascertain the degree of kindred, and at first this was very difficult, for no one

was much more feeling shown; they might romp and riot as much as they would, not a word was ever said to them, nor any thing they did taken amiss. As soon as the child is grown up, however, it comes to his turn to bear with the weaknesses of his parents, which he generally does, treating them with much patience and respect.

To my great surprise I heard the children call their mother *mama* or *nana*, and their father *baba*.

The women lay the whole day on their lazy sides, doing nothing whatever, and only toward evening they made up their minds to get up and make some bread. Their costume was certainly very ill adapted to work of any kind.

showed any affection for any but the little children, who seemed to be regarded as common property. At length I made out that in the whole house there were three families related to each other; the grandfather, a married son, and a married daughter. The grandfather was a stout vigorous old fellow, the father of my caravan leader. I had discovered this on the way, for he had been in our party. He was horribly quarrelsome; disputed about every trifle, and constantly contradicted his son, who took it very quietly, and did what his father liked. The animals of the caravan belonged to them both, and were also attended to by a grandson of fifteen and some servants; but when he had once got home the old man gave himself no further concern about them, but enjoyed his rest, and merely gave his orders. It was easy to see that he was the patriarch of the family.

On the first impression the character of the Arab appears cold and reserved. I never saw either husband or wife, father or daughter, exchange a friendly word; they spoke to each other only when it was absolutely required. For the children there

THE RACES OF MAN:

AND THEIR

GEOGRAPHICAL DISTRIBUTION.

BY

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UNITED STATES EXPLORING EXPEDITION.

LONDON:

JOHN CHAPMAN, 142, STRAND.

MDCCCLXIX.

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CHAPTER XXI.

INTRODUCED ANIMALS AND PLANTS OF AMERICA.

AMERICA, when first visited by Europeans, appears to have contained but a single species of quadruped of foreign origin, the domestic *dog*. The route of its introduction, is indicated by various circumstances; such as, the aboriginal use of this animal for draught on both sides of Behring Straits, and the interweaving of the hair in blankets by the neighbouring maritime tribes. We shall find, moreover, a geographical coincidence; for according to the presumed order of human migrations, All foreign animals wheresoever occurring in aboriginal America, should be equally in the possession of the North-western tribes.

a. *Plants of Aboriginal Introduction.*

Independently of the usual habits of sea-going people, the Latitudes above referred to, preclude agriculture; and we have thus, a ready explanation, of the absence of this art from the adjoining more southern portion of the American continent. For until the recent visits of foreigners, "no Oregon native had ever thought of planting a seed." It is clear then, that no cultivated plant was introduced into America by this Northern Route: but we cannot speak so positively in regard

to weeds.—I found two weeds, growing abundantly around the Chinook villages, *Polygonum aviculare*, and *Chenopodium album*: and Mr. Brackenridge, met with a third, *Plantago major*, in the secluded district of Gray's Harbour.

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b. *Animals and Plants recently introduced into Northwest America.*

I shall mention in the first place, the animals and plants which have been fairly imparted, and have attached themselves to the aboriginal tribes of Oregon:

Horses, were found by Lewis and Clarke, among the tribes of Interior Oregon; having been derived from the Spaniards of New Mexico.

—It seems, therefore, the more remarkable, that horses have not been acquired by the wild tribes of the Sacramento.

Helianthus, an annual species, and the only weed I saw growing around the native villages of Interior Oregon, was perhaps aboriginally introduced from the southward.—I met with the same plant, however, at the California settlements.

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Pectocarya penicillata, (a Boragineous plant,) was seen on the north branch of the Columbia River, growing as a weed around Fort Okonagan; a post, where the soil is not cultivated. The plant may have accompanied the cattle from the Lower Columbia; and its history, seems connected with that of the preceding plant. Moreover, these two, were the only introduced plants I could discover growing around Fort Okonagan.

Solanum tuberosum. The French Catholic missionaries and the Hudson Bay Company, have imparted the cultivation of the potato to the Chinooks of the Straits of De Fuca. The potato, was also seen cultivated at one native village on the north branch of the Columbia.

The other plants and animals introduced by the Hudson Bay Company, were found to be confined to the immediate environs of Forts Colville, Nisqually, and Vancouver, and to the agricultural settlements on the Willamette and Cowalitz. The plants under cultivation at the two first-named places, were few, and were not specially noted: but at Vancouver, an extensive and well-conducted garden, had been established for many years. The original packages of seeds, were brought, some by sea, but chiefly overland from Montreal.

Bullocks, were introduced into Oregon some years prior to our visit.

Sheep, were of somewhat later introduction.

Chenopodium album, already mentioned, as perhaps an aboriginal weed.—Is yet, possibly of European introduction. It was seen in the cultivated ground, at Forts Nisqually and Colville; and unlike the following plants, widely spread over the adjoining prairie.

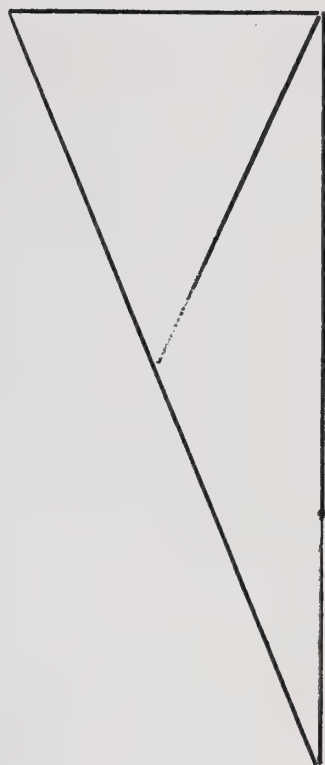
Plantago major, also mentioned, as perhaps an aboriginal weed.—The plant was seen naturalized in pathways, at Fort Colville.

Polygonum aviculare, also mentioned, as perhaps an aboriginal weed; and observed growing in beds around the Chinook villages.—The

plant was seen naturalized around Fort Colville; but, at Fort Nisqually, I met with the broad-leaved variety only.

Polygonum nigrum, was seen established in the cultivated ground at Fort Colville.

Zanthemis cotula, had become an abundant weed around Fort Colville.



Amaranthus, a weed in the cultivated ground at Fort Colville. A species, perhaps the same, was seen at the Kooskoosky station.
Capsella bursa-pastoris, a weed at Fort Colville; a single specimen was found at Fort Nisqually.

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Sonchus oleraceus, a weed in the garden at Fort Nisqually.
Poa annua, observed, both at Fort Nisqually, and at some of the posts in the Interior.
Triticum sativum, wheat, hardly succeeds at Fort Nisqually; but it was said to be cultivated to some extent, on the Willamette and Cowalitz. Three or four varieties, were seen at Fort Colville; whence they had been transferred to the Kooskoosky station.

Hordeum vulgare, barley; together with

Avena sativa, oats; and

Secale cereale, rye; were observed by Mr. Brackenridge, under cultivation at Fort Vancouver.

Pyrus malus, the apple, was said to produce abundantly at Fort Vancouver. But fruit-trees, could hardly be cultivated at Fort Colville; on account of the ravages of the small marmot.

Pyrus communis, the pear. The tree, was seen by Mr. Brackenridge, under cultivation in the garden at Fort Vancouver; together with

Vitis vinifera, the European grape;

Amygdalus Persica, the peach;

Armeniaca vulgaris, the apricot;

Prunus domestica, the European plum;

Prunus cerasus, the European, or the common garden cherry;

Fragaria, several imported varieties of the strawberry;

Ribes rubrum, the garden currant;

Ribes grossularia, the European, or the common garden gooseberry;

Cucumis sativus, the common cucumber;

Cucumis melo, the muskmelon;

Cucurbita melopepo, the squash;

Pisum sativum, the garden pea;

Phaseolus, the common kidney bean;

Solanum melongena, the egg-plant, or aubergine; together with

Beta vulgaris, the beet;

Apium dulce, the celery;

Petroselinum sativum, the parsley;

Allium cepa, the onion; and all the other common garden vegetables.

At the KOOSKOOSKY mission station, irrigation is necessary to agriculture. And in all probability, the seeds of some of the plants which were seen cultivated and naturalized, had been derived from the United States. The following, is by no means a complete list:

Zea mays, Indian corn, which has always failed in the vicinity of the

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coast, was found to be cultivated with success at the Kooskoosky station.

Daucus carota, the carrot, was seen under cultivation; together with
Lycopersicum esculentum, the tomato;
Brassica oleracea, the cabbage; and various other garden vegetables.
Bidens trifida, had become an abundant weed; growing with
Campanula amplexicaulis, in the irrigated and cultivated ground; and
 accompanied by
Polygonum persicaria: and these three plants, were not met with in
 any other part of Oregon.

At the Bay of SAN FRANCISCO, the introduced plants, had arrived by a third route, that of Mexico: and a variety of species, (mostly European,) have become naturalized; notwithstanding that cultivation is on a very limited scale. I shall notice only the five following:

Mirabilis jalapa, seen cultivated as an ornamental plant.

Anagallis arvensis, naturalized abundantly; but not extending beyond the environs of the Bay.

Erodium, probably a European species, and introduced with cattle. Perhaps the same, with one seen naturalized at the Kooskoosky station; and also in Chili.

Avena sativa, the common oat, has now overspread the environs of the Bay; in some instances, taking exclusive possession of the prairie. Mr. Brackenridge, in coming with the land-party from Oregon, "first met with the oat in the valley of the Sacramento, about one hundred and fifty miles above tide-water."

Mollugo verticillata, was found by Mr. Brackenridge on the Upper Sacramento, in the vicinity of the Shasty Mountain.

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Some of the plants enumerated in the NEW ZEALAND column, are not Tropical productions (like those generally accompanying the Polynesians), but they seem rather to belong to Northern climates; and yet, they were found already in New Zealand, by Cook and Forster. A careful examination into the facts, and a comparison of specimens, will doubtless explain the seeming discrepancy with the laws of botanical geography. The plants referred to, are:

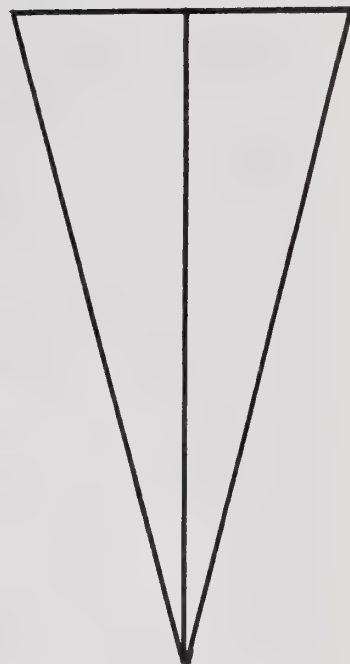
Sonchus oleraceus, observed to be disseminated throughout the Interior. I have had occasion to remark, both within and without the Tropics, that this plant is one of the first to extend itself over the new countries in which it obtains foothold.

Sicyos angulata, frequent around the native villages. The leaves, are sometimes boiled for greens; but I am not sure that this custom is aboriginal.

Calystegia sepium, growing apparently wild on the borders of openings, and observed to be disseminated throughout the Interior.

Phalaris Canariensis, likewise observed to be disseminated throughout the open country.

The natives of AUSTRALIA, being for the most part devoid of clothing, and possessing very few manufactures, have contributed perhaps less than any other branch of the human family, to the dispersion of seeds and plants.—Moreover, if plants have been aboriginally introduced into Australia; this has been done in all probability, by visitors. Indeed, the Northern coast, is known to have been frequented for many centuries, by Malay tribes, and even by Chinese; and it does not seem probable, that the Eastern coast, has altogether escaped accidental visits from Papuans and Polynesians.—In the above Table of



localities, the Australian column will be found nearly blank; and the species most deserving of inquiry, are reduced to the following: *Siegesbeckia*, observed growing on the flats of the Hunter River. The specimens, have not been compared with Polynesian. *Sapum*, found by Mr. Rich in the agricultural district of Illawara. The specimens, have not been compared with Polynesian. *Calystegia sepium*, observed only in wild situations: as in New Zealand.

A
GENERAL VIEW
OF THE
WRITINGS OF LINNÆUS.

BY
RICHARD PULTENEY, M.D. F.R.S.

THE SECOND EDITION;
WITH CORRECTIONS, CONSIDERABLE ADDITIONS.

AND
MEMOIRS OF THE AUTHOR,

BY
WILLIAM GEORGE MATON, M.D. F.R.S. F.S.A.

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS,
AND A VICE-PRESIDENT OF THE LINNEAN SOCIETY OF LONDON.

TO WHICH IS ANNEXED

THE DIARY OF LINNÆUS,

WRITTEN BY HIMSELF.

AND NOW TRANSLATED INTO ENGLISH,

FROM THE SWEDISH MANUSCRIPT IN THE POSSESSION OF THE EDITOR.

LONDON:

PRINTED FOR J. MAWMAN. IN THE POULTRY,

BY R. TAYLOR AND CO. 38, SHOB-LANE.

1805.

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BIBLIOTHECA BOTANICA, recensens libros plus mille de plantis hucusque editos, secundum systema auctorum naturale in classes, ordines, genera et species dispositos, additis editionis loco, tempore, forma, lingua, &c. (Amst. 1736. 8vo. pp. 153.) Botanic writers are distributed into 16 classes, in this work, which is by no means so unentertaining as might be expected from the general idea of a catalogue merely; for the author has frequently subjoined short characters of the books, and taken occasion, at the beginning of each class, as also in the orders or subdivisions, to explain several of the terms used in his subsequent writings. The preface contains a short history of the rise and progress of

1. *Patres.*
2. *Commentatores.*
3. *Ichniographi.*
4. *Descriptores.*
5. *Monographi.*
6. *Curiosi.*
7. *Adonistæ.*
8. *Floristæ.*
9. *Peregrinatores.*
10. *Philosophi.*
11. *Systematici.*
12. *Nomenclatores.*
13. *Anatomici.*
14. *Hortulani.*
15. *Mædici.*
16. *Anomali.*

During his stay at Paris, Linnæus had opportunities of adding very considerably to the original materials, and we find him announcing to Haller, in a letter dated from that city*, his being even then enabled to publish a second edition.

botany, and an acknowledgement of the aid which the author received in the compilation of this work, from his friend Dr. Groenland, at Hamburg; Mr. Clifford, The patron of Amsterdam.

M. von Sprekelsen, of his patron, received in the libraries of M. von Sprekelsen, and particularly the libraries of Leyden, and Professor of Botany, viz. novius at Leyden, Professor of authors, following is his classification

ing remarks on the culture of marshy grounds, and on various useful and noxious herbs: particularly the *Stakar* (supposed to be the *Phellandrium aquaticum*, or *Water-hemlock*, which, it is believed, renders horses that eat it paralytic), the *Gramen manna*, or *Festuca fluitans* (the seeds of which are so particularly useful for fattening geese), the *Agaricus muscarius*, &c.

In 1749 was published the first volume of a collection of dissertations in octavo, under the title of AMENITATES ACADEMICÆ, seu *Dissertationes variæ physica, medica, et botanica*. Linnæus and Camper both published it in the same year, the former at Stockholm and the latter at Leyden*; but Linnæus alone continued the work afterwards, though the volumes were all constantly reprinted, as soon as published, both in Germany and Holland. As these academical theses were sustained under Linnæus in his professorial capacity, and selected chiefly by himself, they have been regarded as of equal authority nearly with his own writings, various parts of which they extend and exemplify, in a particular manner. We shall therefore, in a more convenient part of this book, give a brief account of the several volumes, in their order, specifying the purport of each dissertation, with the name of the student by whom it was written and defended.

Whilst Linnæus was meditating one of his capital performances, which had long been expected, and greatly wished for, by his pupils, he was interrupted by a long and painful fit of the gout. He informs us, in his Diary, that he owed his recovery from this complaint to wood strawberries, of which he

PHILOSOPHIA BOTANICA.

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had accidentally eaten some quantities, and to which he afterwards had recourse annually, finding them a very successful preventive, as well as remedy. The present attack, however, left him in a very weak and dispirited state; and according to the intelligence which his friends gave of him, nothing was thought to have contributed more to the restoration of his spirits than the seasonable return of his pupil Kalm, with a large collection of rare and undescribed plants, from America.

Upon the recovery of his health, he published the PHILOSOPHIA BOTANICA, in qua explicantur fundamenta botanica, cum definitionibus partium, exemplis terminorum, observationibus rariorum, adjectis figuris æneis. (Holmiæ et Amstelodami 1751. 8vo. pp. 362. tabb. 11.) This must be considered as the institutions of the Linnean system of botany, and is a work which none, who wish to be acquainted with that system, can be without, as it is the author's own comment on his *Fundamenta* (first published in 1736), which are comprised in 365 aphorisms, divided into 12

chapters. The author's original intention was to have explained all these aphorisms at large, in the manner that had been adopted in the *Bibliotheca Botanica*, *Classes Plantarum*, *Critica Botanica*, &c.; but, he says, his numerous avocations did not allow him the requisite time. Neither did he afterwards add to, or alter the work, the present being the only edition that came from his own hands*.

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In 1753 appeared (what Haller emphatically terms) Linnæus's "maximum opus et æternum:" the SPECIES PLANTARUM exhibentes Plantas rite cognitæ ad genera relatas, cum differentiis specificis, nominibus trivialibus, synonymis selectis, locis natalibus, sectarum

systema sexuale digestas. (Holm. 8vo. Tom. 1. pp. 550; Tom. 2. p. 561—1200.) To give this work its utmost perfection had been the author's object for many years, and to this all his other botanical productions were in some measure only preparatory, (especially the local catalogues,) as the rightly ascertaining of species is the great end of all method.

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It is in this work that Linnæus first employs trivial names; which are, single epithets, expressive, as far as possible, of the essential specific differences among the species of the genus, or, in default of these, of some striking and obvious character; and not

